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MANAGEMENT OF DEFENSE ENERGY
RESOURCES. PHASE II REPORT

Assistant Secretary of Defense (Installations
and Logistics)
Washington, D. C.

22 July 1974

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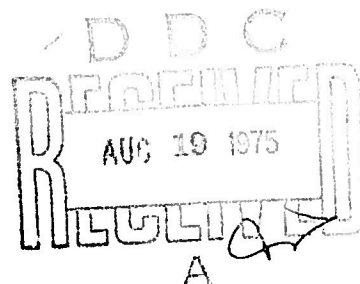
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MANAGEMENT OF DEFENSE ENERGY RESOURCES

PHASE II REPORT

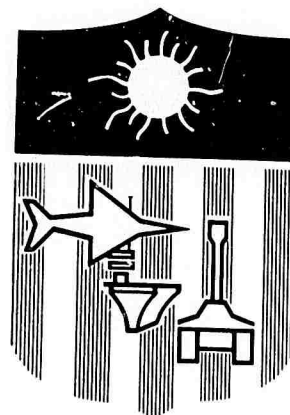
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report summarizes the progress made in carrying out the recommendations of the Defense Energy Task Group and analyzes the evolving character of the DoD energy management program. Further, it examines the current directions of DoD energy policy and makes new recommendations in selected energy management areas. Chapters of the report cover: World, U.S. and DoD energy situation and DoD energy management; Defense energy requirements and (over)		

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budget impact; petroleum storage and distribution; flexibility in fuel selection; Naval Petroleum and Oil Shale Reserves; Defense energy conservation; energy research and development; and organization and management.

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THE SECRETARY OF DEFENSE
WASHINGTON

26 AUG 1974

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MEMORANDUM FOR Assistant Secretary of Defense (Installations & Logistics)

SUBJECT: Management of Defense Energy Resources - Phase II

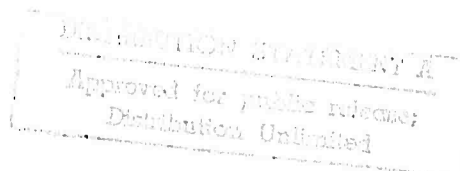
Based on my review of your Phase II Report on Management of Defense Energy Resources, I believe we should proceed with implementation of the recommendations contained therein. Please take action in your capacity as Chairman of the Defense Energy Policy Council to issue the necessary implementing memoranda and to establish target dates for progress reviews.

Although the acute petroleum shortages which we experienced a few months ago have been eased, we should move ahead expeditiously to improve our capability for dealing with such shortages which may occur again. Therefore, it is essential that we maintain the momentum which has been developed in moving toward greater efficiency in the management and consumption of energy resources in the DoD.

James R. Schlesinger



X.





INSTALLATIONS AND LOGISTICS

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

22 July 1974

MEMORANDUM FOR Assistant Secretary of Defense (Installation and Logistics)

SUBJECT: Management of Defense Energy Resources - Phase II Report

The subject report which was prepared by direction of the Defense Energy Policy Council is submitted herewith. This report has been coordinated with the members of the Policy Council as well as the Military Departments and other interested DoD organizations. The report has been printed in three sections consisting of an unclassified Executive Summary, an unclassified volume of eight chapters, and a classified volume containing an Executive Summary and a ninth chapter. The format parallels that of the 15 November 1973 Defense Energy Task Group (DETG) Report.

This Phase II report has been prepared with three objectives in mind:

- o Assess the status of recommendations made in the DETG Report.
- o Evaluate the impact of events since the DETG Report was prepared.
- o Define the plan for managing Defense energy resources in FY 75.

Generally speaking, the DETG recommendations have been carried out or are well on the way to completion. In retrospect, formation of the DETG and its transition into the Directorate for Energy were most timely in preparing the DoD to deal with critical fuel shortages caused by the oil embargo, as was initiation of integrated management of bulk petroleum products by the Defense Supply Agency on 1 July 1973. Significant achievements since November 1973 have been the creation of the Defense Energy Information System and attainment of energy savings well in excess of the 15 percent conservation objective.

Notwithstanding the progress we have made, much remains to be done. The major thrusts for the future which are described in this Phase II report are to:

- o Maintain conservation momentum while meeting readiness needs.
- o Seek retention of mandatory allocation for petroleum and application to coal.
- o Increase petroleum inventory to Prepositioned War Reserve Requirement levels and establish and fund a five-year Fuel Storage Improvement Program.
- o Support exploration and development of Naval Petroleum Reserves in POM 76.
- o Establish and fund a five-year Facility Conservation Program.
- o Focus the energy-motivated R&D program on DoD missions and participate in Project Independence.
- o Make energy effectiveness a consideration in weapon system development.
- o Maintain DoD energy management organizations as currently established.

With your concurrence in the report's recommendations, we shall continue to strive for more effective management of our energy resources and to pursue an activist role in this regard.



N. Sonenshein
Rear Admiral, U.S. Navy
Director for Energy

MANAGEMENT OF DEFENSE ENERGY RESOURCES

PHASE II REPORT

22 JULY 1974

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

INTRODUCTION

A Defense Energy Task Group (DETG) was formed in September 1973 to conduct a comprehensive review and analysis of approaches for managing defense energy resources. The DETG report, which contained 57 recommendations, was submitted to the Assistant Secretary of Defense (Installations and Logistics) on 15 November 1973.

In the 7 months since the DETG report was published, a number of major developments have affected the management of DOD energy resources:

- The nation has been subjected to a retaliatory embargo on crude petroleum shipments from the Organization of Arab Petroleum Exporting Countries (OAPEC)
- A Federal Energy Office (now the Federal Energy Administration) was created to deal with the energy supply shortage and particularly to administer the Mandatory Petroleum Allocation Program
- DOD experienced difficulties in obtaining needed energy supplies, as did the nation as a whole.

This report, Management of Defense Energy Resources - Phase II, summarizes progress made in carrying out the DETG recommendations and analyzes the evolving character of the DOD energy management problem. It examines the current directions of DOD energy policy and makes new recommendations in selected energy management areas.

THE WORLD ENERGY SITUATION

Energy supply problems have been a focus of world attention for the last 7 months. The embargo on crude exports to Western Europe and the United States from the OAPEC countries following the Mideast conflict in late 1973 led to severe mandatory curtailments of petroleum consumption throughout the Western World.

The embargo was lifted in March 1974, but the restoration of Mideast oil flow will not necessarily ease the shortage of petroleum products in the long term. In view of the OAPEC nations' reported interest in conserving their resources, it appears that possible supply curtailments will continue to be an international concern.

The embargo accelerated the rapid rise in the price of crude oil and refined products. Although prices have stabilized recently, they are at levels far above pre-embargo prices. The prospects are for continued vulnerability to supply constraints and sustained high prices for Mideast crude. The consequent international payments deficit has further increased the importance of developing U.S. coal and oil resources.

THE UNITED STATES ENERGY SITUATION

The U.S. energy situation is strongly dependent on the international energy market in petroleum. The OAPEC embargo had a major impact on oil supplies during the past winter and brought home the vulnerability of the nation to short-term supply disruptions. Other factors that must be considered in defining the U.S. energy situation today include the extent to which the nation can increase its reliance on nuclear power and its coal reserves. Diversification of energy sources and the creation of protective cushions must surely be the hallmarks of future U.S. energy programs.

The Arab embargo plus growing domestic demand led to a peak shortfall during the winter of 1973-1974 of about 10 percent of total requirements. Much of this shortfall was absorbed through reduced production of gasoline. The shortfall also caused a number of public utilities and industrial firms to convert their boilers to coal.

Since the DETG report was prepared, the Federal Government has sought to develop an administrative capability to deal with energy policy issues. When the reality of the embargo became apparent, the Federal Energy Office (FEO) was created in December of 1973. The principal mission and responsibility of FEO during its first months was to formulate and implement allocation and conservation programs. A more permanent organization, the Federal Energy Administration (FEA), has succeeded FEO and has assumed a major role in both long- and short-range energy policy and planning. One of the major programs now being considered by FEA and other Federal Agencies

is Project Independence, a program to make the United States more energy self-sufficient. DOD is participating in project planning in areas of its interest through membership in appropriate interagency panels.

THE DOD ENERGY SITUATION

Total FY75 DOD energy requirements are estimated to be approximately 2.2 percent of national requirements (Fig. 1), and FY75 DOD petroleum requirements are projected to be 3.4 percent of national demand (Fig. 2). The distribution of total energy and petroleum by operational function is shown in Figure 3.

The petroleum embargo and the rapid increases in the price of crude oil and refined products have had a significant impact on DOD energy management. The Defense Production Act (DPA) was implemented in November 1973 to ensure that fuel requirements could be met. Later the Mandatory Petroleum Allocation Program served as the instrument for guaranteeing adequate supplies of fuel. Without the allocation program, DOD would have been unable to obtain requisite amounts of petroleum products in the open market. A similar supply problem was encountered with coal in the late spring of 1974, raising the prospect of further procurements under the DPA.

The impact of price has been the most important long-range consequence of the events in recent months. As a result of escalating prices, DOD has had to request a supplement to FY74 funds of almost \$1 billion. In FY75 an appropriation of about \$4.4 billion will be required for energy alone, representing about 4.5 percent of the DOD planned budget.

A number of measures have been undertaken or carried out within DOD to address the foregoing problems:

- A Defense Energy Council in OSD and a Directorate of Energy supported by an Energy Action Group were established to coordinate DOD actions to meet the energy supply crisis and to work with FEO
- Modifications have been made to the Federal Allocation Program that are expected to ease DOD petroleum supply problems

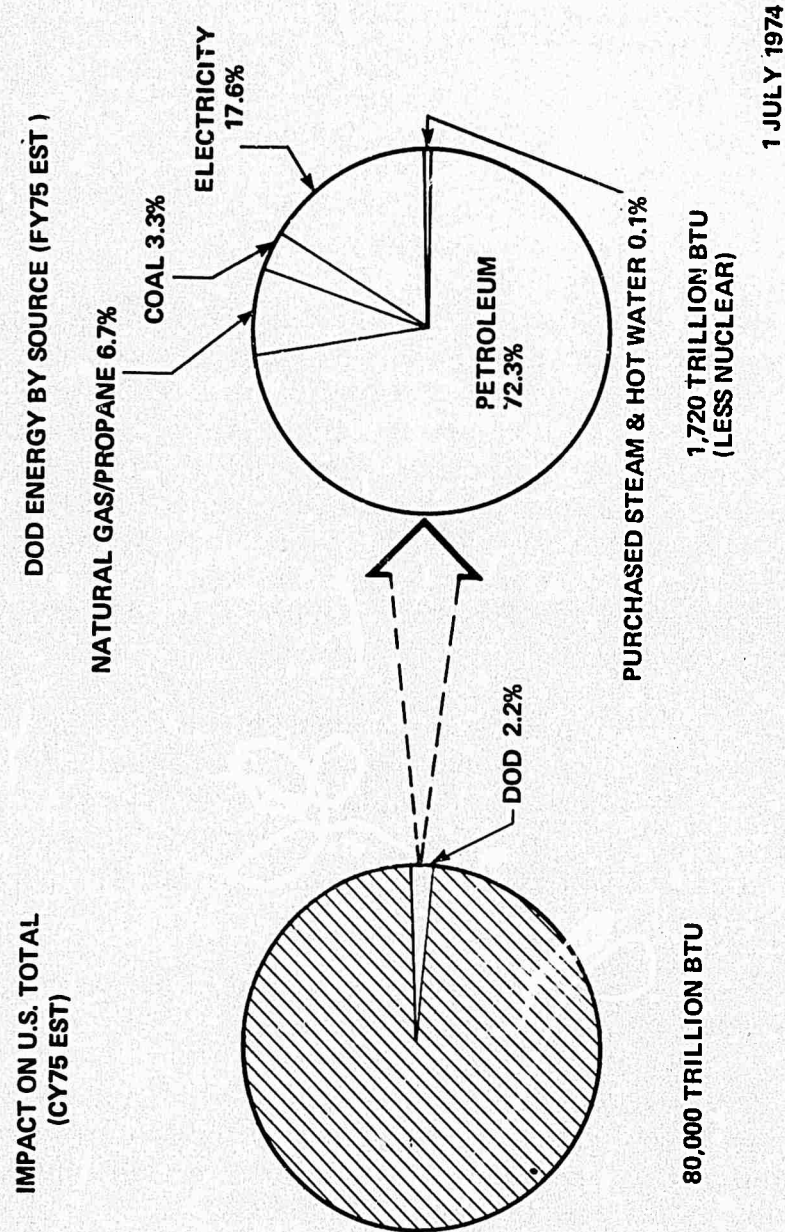
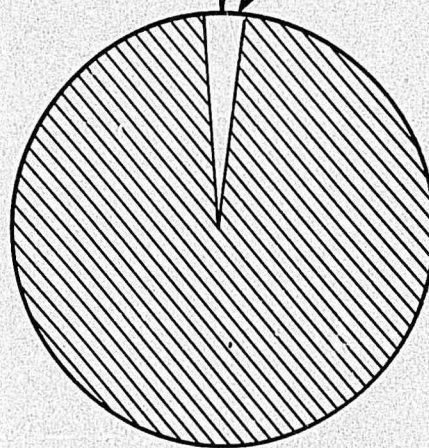


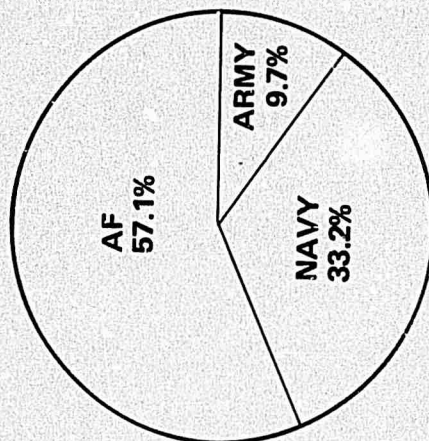
FIGURE 1. TOTAL DOD ENERGY (EXCLUDING NUCLEAR)

IMPACT ON TOTAL U.S.
PETROLEUM DEMAND



18,500,000 BPD

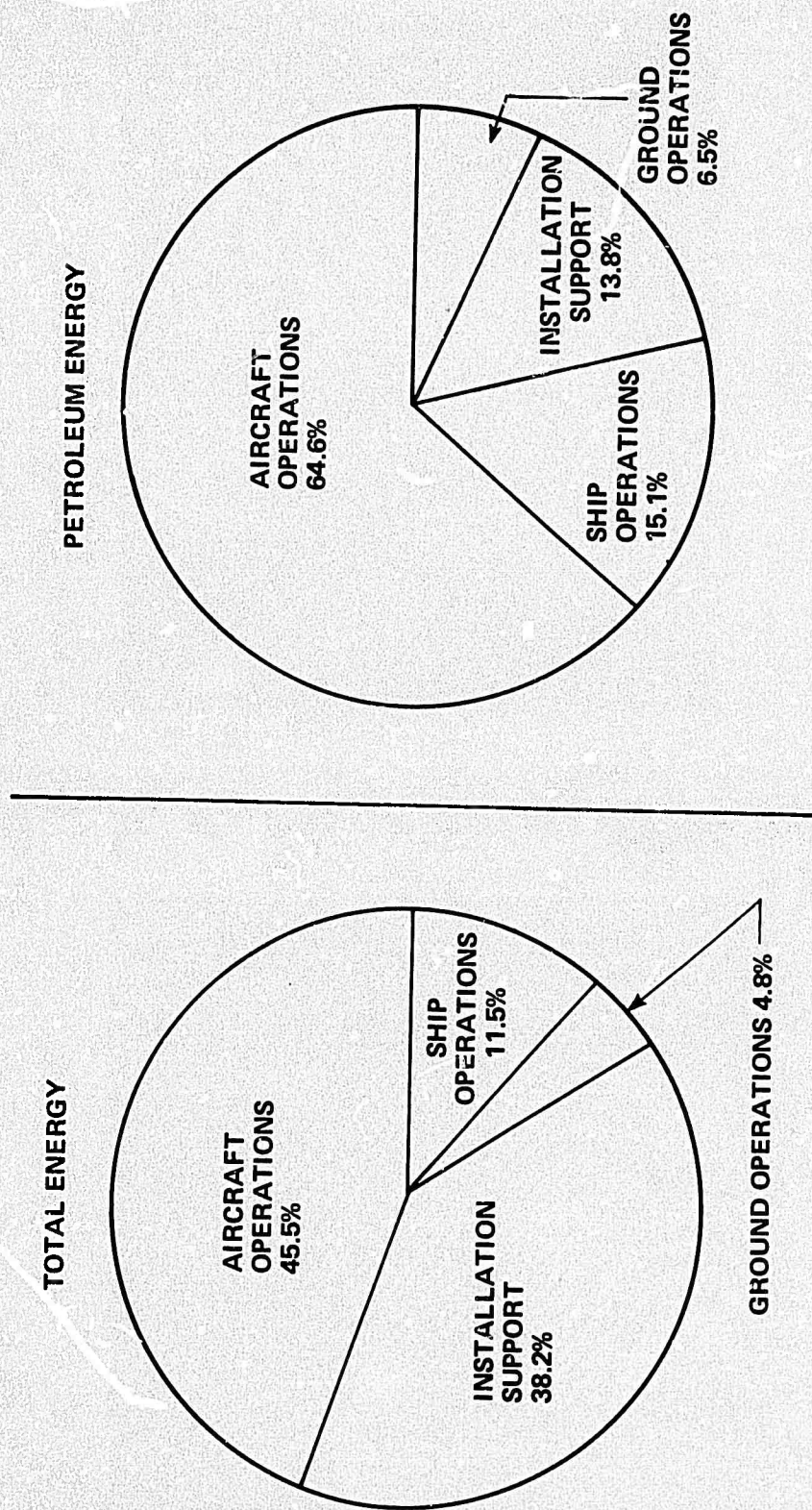
PETROLEUM DEMAND
BY SERVICE



620,000 BPD

1 JULY 1974

FIGURE 2. ESTIMATED TOTAL FY75 DOD PETROLEUM ENERGY DEMAND



1 JULY 1974

FIGURE 3. ESTIMATED FY75 DOD ENERGY DEMAND (BY OPERATIONAL FUNCTION)

- A JCS review of war reserves has been initiated to assess the degree to which dependence of overseas forces on foreign fuel supplies should be reduced
- A major DOD energy conservation effort has been undertaken with the theme "Save Defense Energy" (see Fig. 4); through dedicated efforts at the OSD and Service levels, significant reductions in energy consumption have been achieved
- A Defense Energy Information System (DEIS) has been established to facilitate effective control management and visibility of available DOD fuel resources domestically and abroad
- Energy R&D planning is being integrated with the national effort through the Office of Management and Budget (OMB) and the FEO Project Independence activities.

DOD ENERGY MANAGEMENT: NEW GOALS AND DIRECTION

The topics introduced in the preceding discussion and others are treated in greater detail in the balance of the report, which comprises seven chapters:

- Defense Energy Requirements and Budget Impact
- Petroleum Storage and Distribution
- Flexibility in Fuel Selection
- Naval Petroleum and Oil Shale Reserves
- Defense Energy Conservation
- Energy Research and Development
- Organization and Management.

A classified supplement is presented as a separate chapter. Each chapter includes a review and analysis of the progress that has been made on the DETG recommendations of 15 November 1973. Major events that have altered the situation in the last 7 months are discussed and new issues and problems identified. Each chapter concludes with new recommendations for action based on the current requirements for DOD energy management.* A summary of these chapters follows.

*The numbers of these new recommendations are prefixed with a "2/" to distinguish them from those made in the DETG report of 15 November 1973.



FIGURE 4. DOD ENERGY CONSERVATION POSTER

DEFENSE ENERGY REQUIREMENTS AND BUDGET IMPACT

DOD FY75 fuel and energy consumption was projected by types of energy (Table 1). The shift from the existing Matrix II energy data reporting format to the recently developed Defense Energy Information System (DEIS) was described. It was estimated that FY75 DOD petroleum consumption would be approximately 15 percent below that for FY73 (Fig. 5). The need and procedures for procurements under DPA in FY74, as well as the importance to DOD of the Mandatory Petroleum Allocation Program were also discussed. DOD's problems in purchasing coal were similarly reviewed.

The substantial impact of petroleum prices (Fig. 6) on the DOD budget leading to about \$1 billion in supplemental requests in FY74 was appraised. The potential impact of rising prices on DOD energy cost was assessed (Table 2). The economics of oil pricing and alternatives for procurement were also discussed. The following key conclusions and recommendations were developed.

CONCLUSIONS

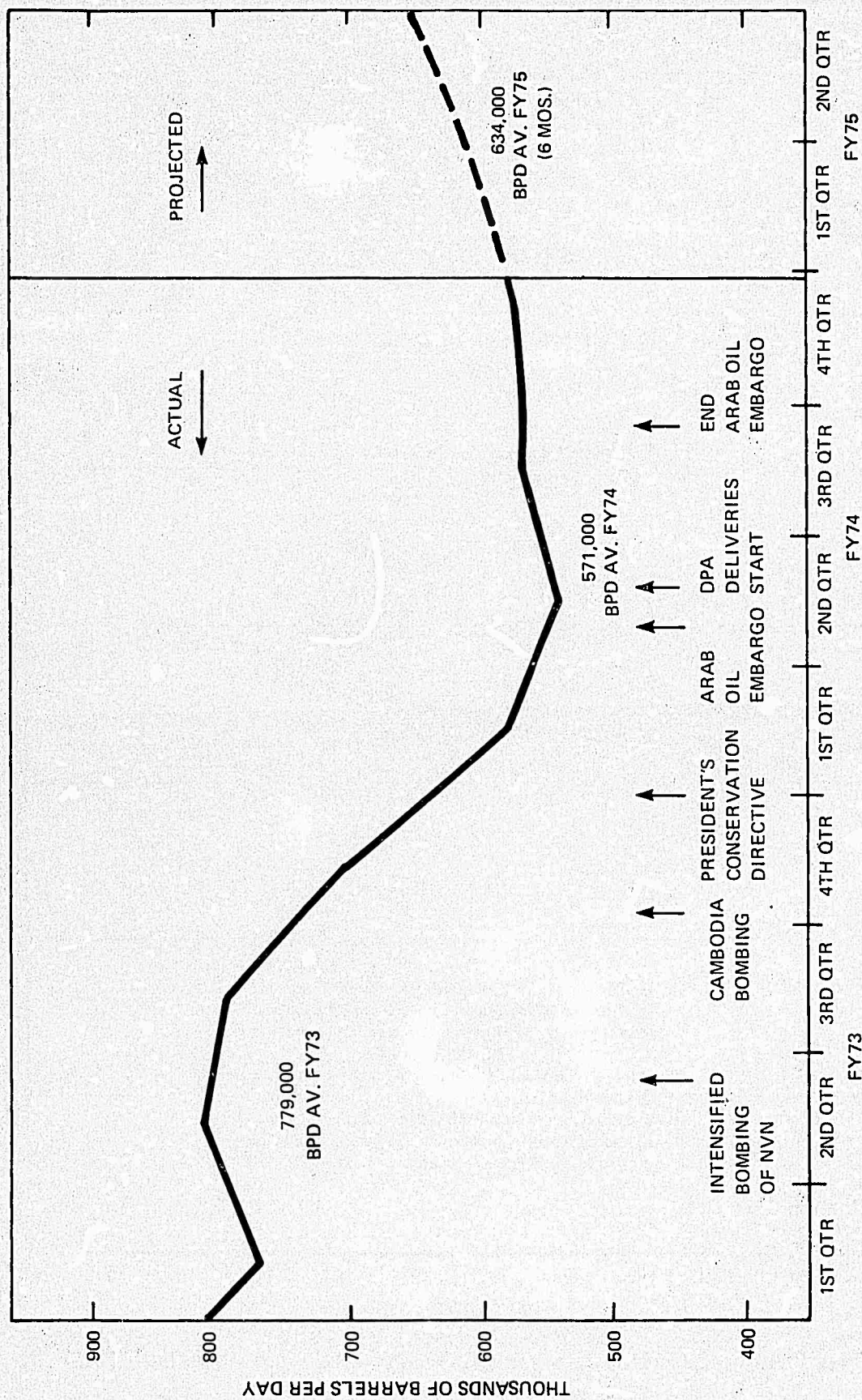
- DOD is going through a dynamic period with little historical basis for predicting total fuel consumption or cost. Principal variables in this situation are: the Vietnam drawdown, Arab oil embargo, conservation program, rising petroleum prices, changing force structure, and changing market conditions.
- DOD petroleum consumption in FY74 will average about 571,000 barrels per day—the lowest since FY55. This consumption rate represents 3.4 percent of the U.S. total, down from 4.3 percent in FY73.
- Economic analysis indicates that in the short term the DOD should maintain a flexible energy procurement policy. Continuing instability in the national and international oil markets, together with uncertainties associated with the increasing role of international politics in those markets, preclude establishment of long-range procurement policies for petroleum at this time. In the short term, the policy of procuring overseas the fuel planned for overseas use is the most logical approach.

TABLE 1
FY75 PROJECTED FUEL CONSUMPTION¹

<u>Installations</u>	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
Electricity (mwh)	7,264,248	6,248,741	6,320,239	6,326,675
(mbtu)				
Heating Fuel (bbls)	84,265,276	72,485,395	73,315,000	73,389,000
(mbtu)	4,154,539	8,705,689	12,054,801	5,823,103
Propane Gas (mbtu)	24,096,326	50,493,000	69,918,000	33,774,000
(tons)	416,000	843,000	991,000	633,000
Natural Gas (mbtu)	18,469,000	30,936,000	39,078,000	24,189,000
Coal (mbtu)	8,141,000	17,635,000	20,457,000	11,163,000
Steam/Hot Water (mbtu)	328,738	710,088	823,500	450,390
	189,000	535,000	687,000	355,000
<u>Mobile Operations</u>				
JP-4 (bbls)	30,480,737	29,224,402	29,386,030	31,145,225
(mbtu)	161,547,900	154,889,330	155,745,950	165,070,000
JP-5 (bbls)	7,390,945	7,348,334	7,333,982	7,376,959
(mbtu)	42,128,386	41,885,503	41,804,000	42,049,000
AVGAS (bbls)	1,368,415	1,311,838	1,311,343	1,336,636
(mbtu)	7,252,600	6,952,741	6,950,000	7,084,000
MOGAS (bbls)	1,783,824	1,731,078	1,756,057	1,825,173
(mbtu)	9,454,267	9,174,713	9,307,000	9,673,000
Other Distillates (Less Heating)				
(bbls)	7,638,229	7,369,676	7,300,318	7,639,310
(mbtu)	44,301,728	42,744,120	42,342,000	44,308,000
Other Residuals (Less Heating)				
(bbls)	873,705	872,995	873,594	872,760
(mbtu)	5,504,342	5,499,868	5,504,000	5,498,000
Total Petroleum (bbls)	53,690,394	56,564,012	60,016,125	56,019,166
Average BPD ²	583,591	614,826	666,845	615,595
Grand Total All Products (mbtu)	405,765,825	434,073,670	466,098,950	417,185,000

NOTES: ¹ Includes worldwide requirements and credit-type, into-plane, and bunkering purchases, but excludes "Sales to Others" (average = 14,000 BPD).

² Average BPD for FY75 = 620,000. When "Sales to Others" are added, it becomes 634,000 BPD.



*INCLUDES "SALES TO OTHERS":

FY73 52,000 FY74 27,000 FY75 14,000

FIGURE 5. DOD PETROLEUM CONSUMPTION TRENDS

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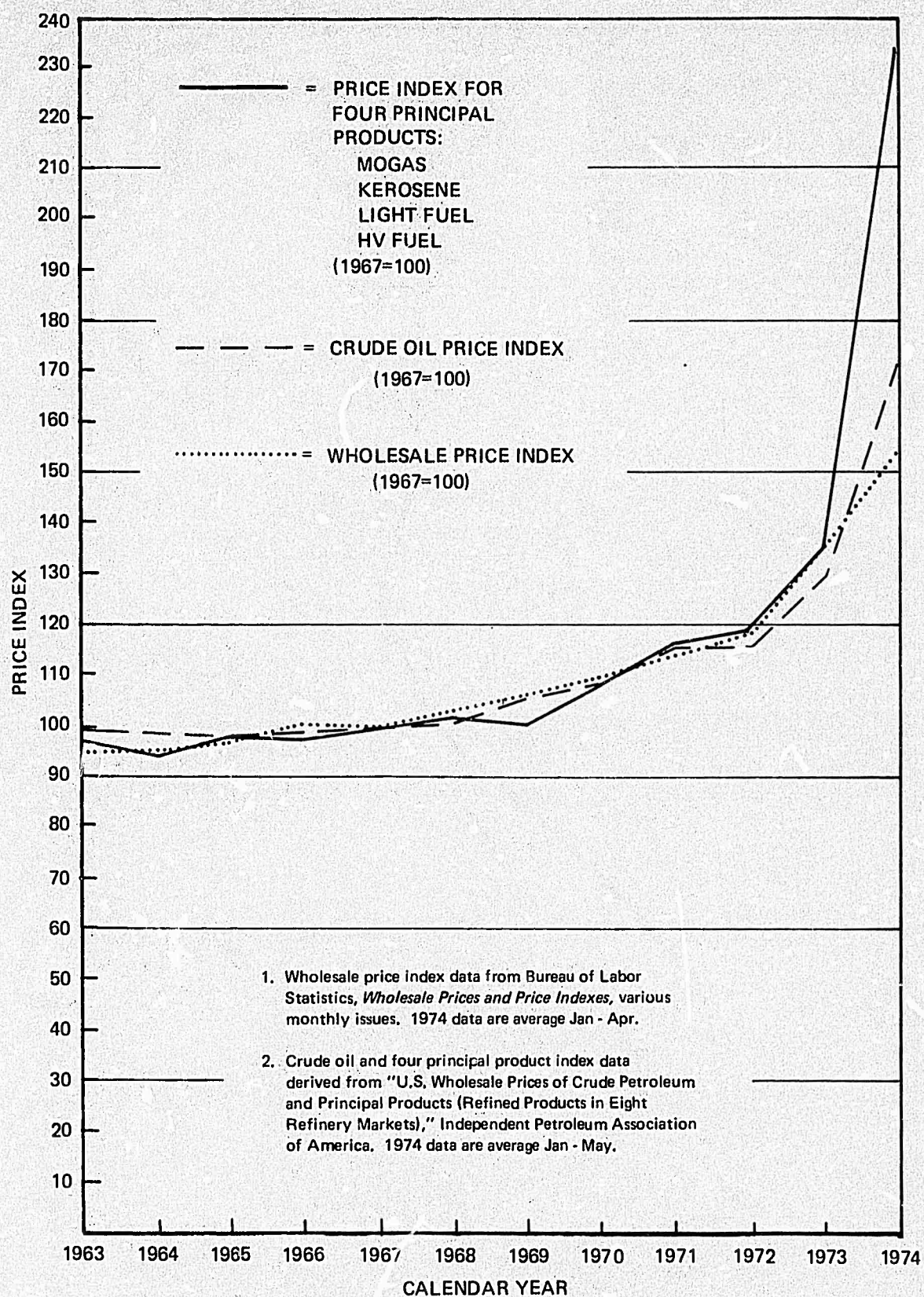


FIGURE 6. OIL PRICES VERSUS WHOLESALE PRICE INDEX
(1967=100)

TABLE 2
POTENTIAL IMPACT OF RISING PRICES ON DOD ENERGY COST
(Dollars in Millions)

PETROLEUM*	FY73 <u>1,381</u>	FY74 <u>2,204**</u>	EST. FY75 <u>3,576.7†</u>
NON-PETROLEUM	497	657	819.4
TOTAL	1,878	2,861	4,396.1
% INCREASE OVER FY73		52%	134%

WEIGHTED AVERAGE

COST PER BARREL	4.94	11.08	14.86
% INCREASE IN AVERAGE			
COST PER BARREL OVER FY73		124%	200%

*All end uses, including bulk, post, camp, and station fuels, and transportation of personnel and material.
 **Based on DOD Average Daily Consumption of 544,000 barrels (199 million barrels per year).
 †Based on DOD Average Daily Consumption of 620,000 barrels (226.3 million barrels per year).

10 June 1974

- A 200-percent increase in DOD standard prices for petroleum products has pushed the annual budget for energy up to about 4.5 percent of the FY75 total DOD planned outlay. Price increases for utilities are still lagging those for petroleum, and their full impact is yet to be felt.
- In spite of the ability to pay market prices, DOD is still having difficulty buying fuel. Domestically, petroleum is still being obtained under mandatory allocation, and the Defense Production Act will have to be invoked for coal if existing shortfalls cannot be covered. Phaseout of mandatory allocations for petroleum may again necessitate use of the DPA for these products.
- Improvements in monitoring energy consumption and projecting requirements must be continued.
- Improvements in accountability for fuel both in budgeting and inventory control must be sought. Expedited billing and payment procedures need to be implemented in view of the increasing value of fuels and to improve the posture of the Defense Fuel Stock Fund.

RECOMMENDATIONS

Recommendation 2/2-1

The Directorate for Energy should continue to develop improvements in techniques for monitoring energy consumption and projecting requirements.

Recommendation 2/2-2

DSA should continue to develop procedures to reduce reporting lag time from field activities and to decrease the response time for billing and payment for fuel.

Recommendation 2/2-3

DSA should, in the short term, procure overseas the fuel planned to be used overseas.

Recommendation 2/2-4

ASD (I&L) should seek establishment of standby procedures for mandatory petroleum allocation if enabling legislation lapses, and should also seek DPA application to coal.

Recommendation 2/2-5

The Director for Energy and ASD(C) need to maintain close liaison in developing logistics and budget data, and should develop budget formats that make visible the growing DOD energy bill.

Recommendation 2/2-6

The Services should review their methods of accounting for fuel receipts, inventory, and consumption and should make improvements where necessary.

PETROLEUM STORAGE AND DISTRIBUTION

The review of progress in implementing the DETG recommendations covered efforts by the Defense Supply Agency (DSA) to provide optimal petroleum storage and distribution facilities in light of changing procurement and fuel use patterns. The review also dealt with recent measures to improve the management of petroleum assets through centralized control. Actions by ASD(I&L) and the Joint Chiefs of Staff to assess the appropriate size and sources of procurement for the Prepositioned War Reserve Stocks (PWRS) were also discussed. Finally, the disruptions caused by the Arab oil embargo were described. During the most severe period of the embargo, DOD was buying 10 to 15 percent of its daily requirements overseas, compared with almost 50 percent previously. The following conclusions and recommendations were developed.

CONCLUSIONS

- The possibility that mandatory allocations may be suspended makes it necessary for DSA to continue its survey of storage facilities for mission-essential heating and ground fuel requirements.
- The detailed joint review of storage requirements undertaken by DSA is now scheduled for completion by 1 August 1974
- Separate recommendations on terminals and handy-size tankers made in the DETG report need to be considered together and in relation to PWRS. Army and Navy programs for discharge at undeveloped ports are underway.
- Peacetime cutoff of supplies during the Arab oil embargo should stimulate thinking on the need for increased operating stocks and alternate methods of storage and distribution.

RECOMMENDATIONS

Recommendation 2/3-1

DSA should continue planning for the acquisition of Government-owned facilities and/or service contract arrangements, to provide uninterrupted support of mission-essential heating and ground fuel operational requirements in the event that mandatory allocations are suspended. Associated budgetary and manpower impact should be identified.

Recommendation 2/3-2

- a. DSA should prepare programs (in accordance with DOD Instruction 4140.25) for modernizing strategic, high-usage military POL terminals (e. g., Norfolk, Rota, Sasebo, Subic Bay) to accommodate tankers up to 80,000 DWT. These programs should be submitted through ASD (I&L) to the Military Departments for the development of MILCON projects.

- b. The Navy should submit a consolidated progress report to the ASD (I&L) on current R&D programs being conducted by both the Army and Navy aimed at providing over-the-beach discharge capability.

Recommendation 2/3-3

ASD (I&L) should ensure through WSEG's studies that an appropriate tradeoff is developed among the need for handy-size tankers, improved terminals for larger tankers, and pre-positioned war reserves.

FLEXIBILITY IN FUEL SELECTION

The report noted that the key to fuel availability in a time of changing relative shortages is the flexibility to use alternative fuels, rather than standardization on a single, widely available fuel. This approach may also offer cost savings. However, it was observed that at present most equipment in the DOD inventory lacks multifuel capability. Actions taken by the DSA, the Defense Standardization Board and the Air Force with regard to fuel standardization were reviewed. Particular attention was given to the use of fuels conforming to commercial standards and NATO specifications. The following conclusions and recommendations were presented.

CONCLUSIONS

- While the Services, especially the Navy, are pursuing fuel standardization where practicable, multifuel capability should be their larger objective. Long-term success in increasing the availability of fuel will depend upon the capability of equipment presently being developed to accept a wide variety of fuels.
- Multifuel capability is not generally being provided in the development of new equipment.
- DSA is seeking to reduce the barrier to fuel availability posed by Federal/military fuel specifications. The Services have not generally been informed of the cost implications of fuel specifications that are more stringent than commercial specifications.

- DOD is incurring premium costs by using Avgas 115/145 instead of 100/130. As the commercial availability of Avgas 115/145 declines, the cost to DOD of long-distance transportation and special refinery runs will make the fuel disproportionately expensive. Present policy justifies these costs by citing the need to retain certain aircraft in the inventory. The need for the aircraft has not been re-examined in the light of the unusual fuel costs incurred by their retention. (The problems of fuel cost and availability affect all military users of Avgas, not just those units operating these aircraft.) The affected aircraft are as shown in Table 3. Many of them are assigned to National Guard units and are nearing retirement. Many of them already pose support problems in terms of spare parts.

TABLE 3
AIRCRAFT USING AVGAS 115/145

<u>AIRCRAFT</u>	<u>R-ENGINE</u>	<u>INVENTORY</u>	
		<u>NAVY</u>	<u>AIR FORCE</u>
C-97	4360	—	76
C-119	3350	77	24
C-121	3350	13	37
C-124	4360	—	26
*C-1A	1820	68	—
*S-2D/E/G	1820 }	319	—
*E-1B	1820 }		
Total		477	163

*CARRIER BASED, will require flight testing to determine if use of 100/130 is possible.

RECOMMENDATIONS

Recommendation 2/4-1

The Directorate for Energy should continue to participate in the drafting of a DOD fuels logistics policy that will require the provision of a multifuel capability in new equipment being procured and developed by DOD.

Recommendation 2/4-2

Following publication of a DOD fuels logistics policy, the Director of Defense Research and Engineering should advise ASD (I&L) which equipment currently under development will have a multifuel capability (as defined by the policy) and which will not.

Recommendation 2/4-3

The Joint Logistics Commanders should determine which piston aircraft in the inventory can be converted to use Avgas 100/130 in a cost- and mission-effective manner during the remaining projected service life of the aircraft. The JLC should develop conversion schedules for those aircraft.

Recommendation 2/4-4

The Joint Logistics Commanders should recommend to their respective Services an accelerated phaseout plan for those aircraft within the inventory that cannot be converted to 100/130 Avgas. This phaseout should be as early as practicable in conformance with operational requirements in order to eliminate a potentially serious mission-support problem.

Recommendation 2/4-5

DSA should analyze the additional cost of those Federal/military fuel specifications or testing procedures that are more restrictive than commercial specifications and so advise the Services. The Services should reexamine their requirement for the additional fuel features in light of the cost data provided by DSA.

NAVAL PETROLEUM AND OIL SHALE RESERVES

The status of the DETG recommendations concerning the Naval Petroleum Reserves (Fig. 7) was reviewed. In particular, Congressional action concerning NPR exploration and development was discussed. Progress in commercial and Federally supported oil shale development was also described. It was noted that successful development of oil shale hinges on environmental factors and the maintenance of oil prices at high levels. Only a small role for the Naval Oil Shale Reserves (NOSR) was seen in the overall development of a shale oil industry. Although other Federal Agencies and industry are expected to take the lead in development, it is expected that new extraction technologies will be applicable to the NOSRs. Preliminary studies of the NOSRs, contingent upon funding, were described. The following conclusions and recommendations were developed.

CONCLUSIONS

- A 5-year funding plan starting in FY76 to continue to explore and develop NPR #1, and a 10-year program to continue to explore NPR #4 will require substantial new funding: \$500 million for NPR #1 and \$525 million for NPR #4 (FY75 dollars).
- Revenues from the Naval Petroleum Reserves, placed in a dedicated account, are an appropriate source of funds to defray the cost of exploring and developing the Reserves. Congressional control of these funds could be retained by requiring a Congressional appropriation prior to their expenditure, as proposed in House Joint Resolution 832.

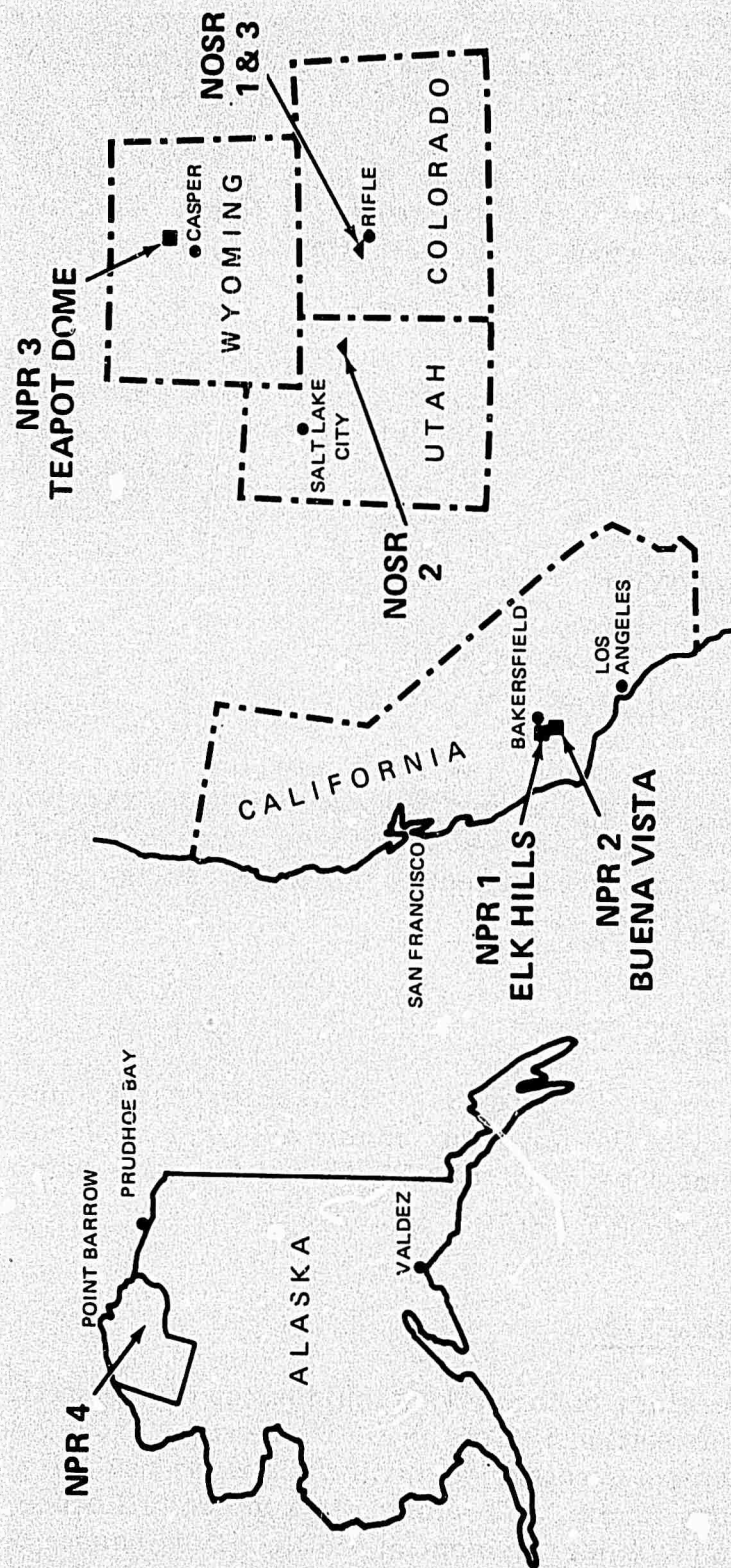


FIGURE 7. NAVAL PETROLEUM AND OIL SHALE RESERVES

- The commercial development of a shale oil industry is underway, although not on a large scale.
- Oil shale cannot supply a significant part of DOD's fuel needs until the late 1980's at the earliest.
- After the development of a commercial shale oil industry, and after its application to the Naval Oil Shale Reserves, the Reserves will constitute a major addition to DOD's strategic reserves.
- Further studies of the NOSRs are warranted by the emerging importance of the Reserves as a national defense asset and by the Government's need to identify those extraction technologies that are best suited to the Reserves.

RECOMMENDATIONS

Recommendation 2/5-1

The Secretary of the Navy, with support from the Secretary of Defense, should continue to seek legislation that would earmark revenues from the Naval Petroleum Reserves for further exploration and development of the Reserves, subject to Congressional approval.

Recommendation 2/5-2

The Secretary of Defense should support the request of the Secretary of the Navy for funding a 5-year exploration and development program at NPR #1 and for a 10-year exploration program at NPR #4.

Recommendation 2/5-3

The Secretary of the Navy should pursue those actions cited in Recommendation 5-3 of the DETG report (that is, develop a procurement strategy permitting industry participation), if the necessary funding and staffing to support full contractual exploration and development of the Reserves cannot be obtained through the normal budget process.

Recommendation 2/5-4

The Secretary of the Navy should keep abreast of technical developments in shale oil extraction and should continue to ensure that the option of applying these technologies to the Naval Oil Shale Reserves is not foreclosed.

Recommendation 2/5-5

The Secretary of Defense should support the request of the Secretary of the Navy for funds to study the Naval Oil Shale Reserves.

DEFENSE ENERGY CONSERVATION

Substantial reductions in DOD energy consumption (as shown earlier in Fig. 5) during FY74 were described. At the end of the third quarter of FY74, the cumulative reduction in energy use compared with the comparable FY73 period was 28 percent, greatly exceeding the President's cutback target of 7 percent throughout the Government (Fig. 8). However, it was noted that such factors as the phasedown of operations in Southeast Asia, supply problems, and the unusually mild 1973-1974 winter contributed to the decrease in consumption. The status of DETG recommendations to ASD (I&L), the JCS, and the Services was reviewed. Little progress was evident in implementing the recommendations to ASD (I&L); many of these recommendations are dependent on budgetary factors. The recommendation addressed to the JCS and most of those addressed to the Services have been implemented. The following conclusions and recommendations were presented.

CONCLUSIONS

- Reductions in DOD energy consumption in FY74 have been significant; however, the extent to which decreases in usage can be attributed to purely energy conservation measures is indeterminate.

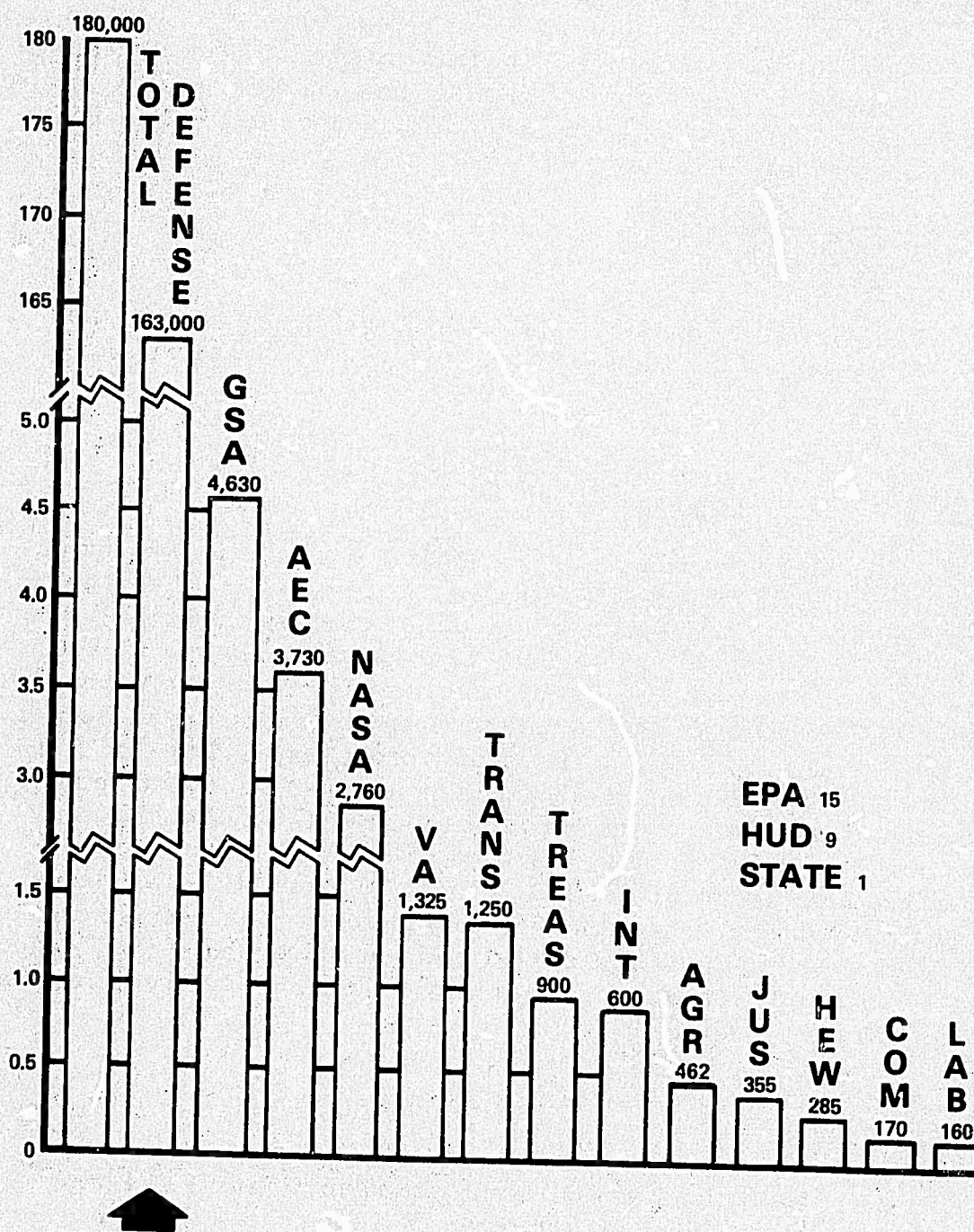


FIGURE 8. TOTAL ENERGY CONSERVED BY FEDERAL AGENCIES
(In Billions of BTUs for Third Quarter of FY74)

- Many of the energy conservation measures implemented wholly or partially in response to the DETG report represent a "first cut" at the problem and were largely concentrated in operational mission areas. Longer term and more complex methods to reduce fuel use and to create institutionalized mechanisms have not been fully developed.
- Present statutory limitations and programming inhibit the implementation of recommendations that require additional manpower and financial resources to make significant energy savings in the installation sector.

RECOMMENDATIONS

Recommendation 2/6-1

The ASD (I&L) should issue revised energy policy guidelines based on a long-term need to foster a strong conservation ethic vice a short period of limited supply caused by an embargo. The following policies are recommended for continued DOD-wide application:

- a. Minimize the administrative use of vehicles, ships, aircraft, and support equipment.
- b. Strive to reduce energy consumption when operating mission equipment.
- c. Within budgetary constraints, retrofit facilities for greater energy efficiency.
- d. Maintain energy conservation task forces, committees, advisory groups, or officers at all levels of command down to battalion, ship, and squadron, with direct access to the commander.
- e. Minimize flight and weapons demonstrations to those essential for training and recruiting purposes. Energy-efficient equipment should be utilized whenever possible.
- f. Buy compact/subcompact commercial sedans and station wagons.

- g. Encourage employee suggestions through incentive awards.
- h. Encourage the voluntary aspects of carpooling with the assignment of preferred parking to carpools.
- i. Conduct periodic orientation and training seminars to exchange information on lessons learned as well as successful practices.
- j. Incorporate energy conservation into troop training and information programs.
- k. Maintain a strong in-house information program fostering the conservation ethic.
- l. Keep large-scale energy-intensive exercises to the minimum level required to maintain readiness and include an energy analysis as part of the planning process.
- m. Consider energy consumption as a factor in the decision process during the design, development, and construction of new facilities and equipment. Prepare energy impact statements for projects costing more than \$1,000,000.
- n. Maintain the 50-mph speed limit for Government vehicles where safety and mission permit.
- o. Maintain heating and cooling temperatures at 65° to 68°F and 78° to 80°F, respectively.
- p. Reduce the fuel consumption of DOD- and GSA-owned administrative-type vehicles by 15 percent from FY73 levels. Mission-essential users, such as recruiting, are exempt.
- q. Exercise control over TDY travel to maximize other means of communication, such as telephonic communications, and multipurpose staff visits.
- r. Continue to assign goals and monitor performance using the DEIS.

- s. Include energy conservation as a special topic for Inspector General and command inspection teams.
- t. Provide for consideration of energy conservation performance ratings into existing Officer and Enlisted Evaluation Systems in order to promote continued interest and strengthen the conservation ethic.

Recommendation 2/6-2

In concert with the ASD(C), the ASD (I&L) should give strong support to funding a 5-year facility conservation program and energy conservation features in new MILCON projects.

Recommendation 2/6-3

The Director for Energy should conduct periodic DOD energy conservation seminars to facilitate transfusion of experience among the Services.

ENERGY RESEARCH AND DEVELOPMENT

Action by the Director of Defense Research and Engineering (DDR&E) and the Services to refine DOD energy-motivated R&D participation guidelines was reviewed. The matrix shown in Table 4 reflects the most recent guidance. Techniques to incorporate consideration of energy factors into weapons system acquisition were also discussed. DOD support in the preparation of a blueprint for Project Independence was also outlined.

The Defense Department is represented on FEA's Interagency Energy R&D Committee, which will oversee the R&D elements of Project Independence. DOD has also been instrumental in developing the first year's increment of a \$10 billion/5-year national program for energy R&D that is being organized by the Office of Management and Budget. Conclusions and recommendations concerning energy R&D are presented below.

TABLE 4
DOD ENERGY-MOTIVATED R&D PARTICIPATION GUIDELINES

<u>Operations</u>	<u>Research</u>	<u>Exploratory Development</u>	<u>Advanced Engineering Development</u>
I. <u>Aircraft Operations - Air Force Lead</u>			
A. Improved Propulsion Aircraft Turbines with Reduced Specific Fuel Consumption	Lead	Lead	Lead
B. Improved Aerodynamic Drag Reduction	Lead	Lead	Lead
C. Multifuel Capability	Lead	Lead	Lead
D. Alternate Fuel for Aircraft Operations			
1. Syncrudes	Incentivize	Incentivize	Incentivize
2. Hydrogen and Methane	Monitor	Monitor	Monitor
E. Improved Aircraft Operational Procedures	Lead	Lead	Lead
II. <u>Ship Operations - Navy Lead</u>			
A. More Efficient Ship Propulsion			
1. Improved Efficiency Conventional Power Plants: Diesel and Steam	Lead	Lead	Lead
2. Advanced Gas Turbines	Lead	Lead	Lead
3. Advanced Topping Cycle Such as Supercritical Carbon Dioxide Brayton Cycle	Monitor	Monitor	Monitor
4. Turbine Driven Superconducting Generator Motor Propulsion Driven Systems	Lead	Lead	Lead
5. Nuclear Ship Propulsion (Less Reactors)	Lead	Lead	Lead
B. Multifuel Capability	Lead	Lead	Lead
C. Burn Less Critical Fuels			
1. Syncrude Fuels	Incentivize	Incentivize	Incentivize
2. Other Alternate Fuels	Monitor	Monitor	Monitor
D. Combined Chemical Dash Power and Nuclear Cruise Power Systems	Lead	Lead	Lead
E. Reduction in Non-Propulsive Energy Consumption-Improved Conversion Efficiency			
1. Total Energy/Waste Heat Recovery Systems	Participate	Participate	Monitor
2. Integrated Energy/Waste/Water Management System	Participate	Participate	Monitor
III. <u>Installations and Buildings - All Services & ARPA</u>			
A. Optimum Utilization of Technology & Equipment			
1. Conduct Analyses of DOD Buildings and Installations To Determine the Optimum Way To Invest Available DOD Energy Conservation Dollars To Maximize BTU Saved Per Dollar	Monitor	Monitor	Monitor
2. Conduct Further Performance and Economic Analyses on Primary and Supplementary Heating and Cooling; Provide Buildings for Trial Use	Monitor	Monitor	Monitor
3. Total Energy Systems That Recover and Use Waste Heat	Participate	Monitor	Monitor
4. Improve Efficiency Base and Building Energy (Heating and Cooling) Distribution Systems	Incentivize	Incentivize	Incentivize
5. Optimum Location of New Buildings and Site Placement	Incentivize	Incentivize	Incentivize
6. Energy Independence for Remote Bases	Lead	Lead	Lead

TABLE 4 (Continued)

	<u>Operations</u>	<u>Research</u>	<u>Exploratory Development</u>	<u>Advanced/ Engineering Development</u>
III.	<u>Installations and Buildings (Continued)</u>			
	B. Advanced Technology			
	1. Advanced Power Plants of Improved Efficiency That Are Convertible to Substitute Fuels Such as Coal and Syncrude	Monitor	Monitor	Monitor
	2. Advanced Methods of Energy Storage and Distribution	Monitor	Monitor	Monitor
	3. Alternate Energy Sources and Fuels (e. g., Solar, Geothermal, Nuclear)	Monitor	Monitor	Monitor
IV.	<u>Ground Operations - Army</u>			
	A. Vehicles			
	1. Stratified Charge Gasoline Engines	Participate	Participate	Participate
	2. High-Performance High-Speed Diesel Engines with Good Efficiency over a Wide Load Range	Participate	Participate	Participate
	3. Open-Cycle Gas Turbines with Recuperators To Increase Efficiency	Participate	Participate	Participate
	4. Multi-Speed Lockup Transmissions with High Efficiency and Smooth Operation	Participate	Participate	Participate
	B. Mobile Electrical Power Systems			
	1. Stirling Engine - Generators	Lead	Lead	Participate
	2. Small Fuel Cells	Lead	Lead	Participate
	3. Efficient Turbo-Alternators	Lead	Participate	Participate
	C. Multifuel Capability	Lead	Lead	Lead
	D. Advanced Fuels and Power Systems			
	1. Refined Syncrude Fuels	Incentivize	Incentivize	Incentivize
	2. Hydrogen	Monitor	Monitor	Monitor
	3. Closed Brayton Regenerative Gas Turbines	Participate	Participate	Participate
	4. Fuel Additives (e. g., Methanol)	Participate	Participate	Participate
	5. Nuclear Energy Systems Such as Nuclear Powered Total Energy Depots and Radioisotope Power Generators	Participate	Participate	Participate

CONCLUSIONS

- DOD policy on participating in the solar portion of the national energy R&D program is sound and should be considered for application in other areas of the national program if so requested.
- An adequate review of DOD planned and programmed energy-related and energy-motivated R&D projects to assure compliance with the refined R&D matrix and guidance has not been accomplished.
- There is a need to strengthen policy and procedural guidance with respect to appraising the energy impact of alternative approaches in development of defense systems.

RECOMMENDATIONS

Recommendation 2/7-1

The Director of Defense Research and Engineering should conduct a comprehensive review of DOD energy-motivated R&D projects submitted by the Services and ARPA for conformance with current guidance.

Recommendation 2/7-2

The Director of Defense Research and Engineering should introduce the concept of "energy effectiveness" as a measure of merit in parallel with "cost effectiveness" and "mission effectiveness" in DOD studies and management decisions concerning weapon system development and acquisition.

ORGANIZATION AND MANAGEMENT

Actions to create institutional and management mechanisms to deal with DOD energy problems were described. The establishment of the Defense Energy Policy Council, Energy Action Group, and Directorate for Energy was reviewed. These and other energy

management elements are shown in Figure 9. The results of Service efforts to establish their own centralized organizations to deal with energy matters were also described. DSA's organization and responsibilities in energy management, and DOD's mechanism for liaison with FEA were also discussed. Particular attention was given to ASD (I&L)'s Defense Energy Information System (DEIS), which provides worldwide consumption, receipt, and inventory data for all petroleum products on a weekly basis, as shown in Figure 10. After describing all energy management actions at the DOD and Service staff levels, the effectiveness of the new organizations and mechanisms was appraised. The following conclusions and recommendations were presented.

CONCLUSIONS

- The Defense Energy Policy Council has proven to be an effective mechanism for coordinating policy, resolving problems, and exchanging information. Its effectiveness would be improved through Service participation.
- The Directorate for Energy constitutes a viable organization for energy management within the Office of the Assistant Secretary of Defense (Installations and Logistics).
- The Defense Supply Agency management structure and procedures have been effective in carrying out its assigned responsibilities. Limited by embargo-induced stresses, DFSC is moving to a stronger management orientation.
- The Office of the Director of Army Research, with the assistance of the Army Scientific Advisory Panel, should provide a viable mechanism for determining Army energy R&D involvement to ensure that Army mission requirements are being met.
- The Navy Energy and Natural Resources Research and Development Office (MAT-03Z) is doing a commendable job in managing energy R&D for the Navy. Other elements of the Navy energy management organization merit re-examination for adequacy.
- The Air Force energy organization is disproportionately staffed by temporary-duty personnel.

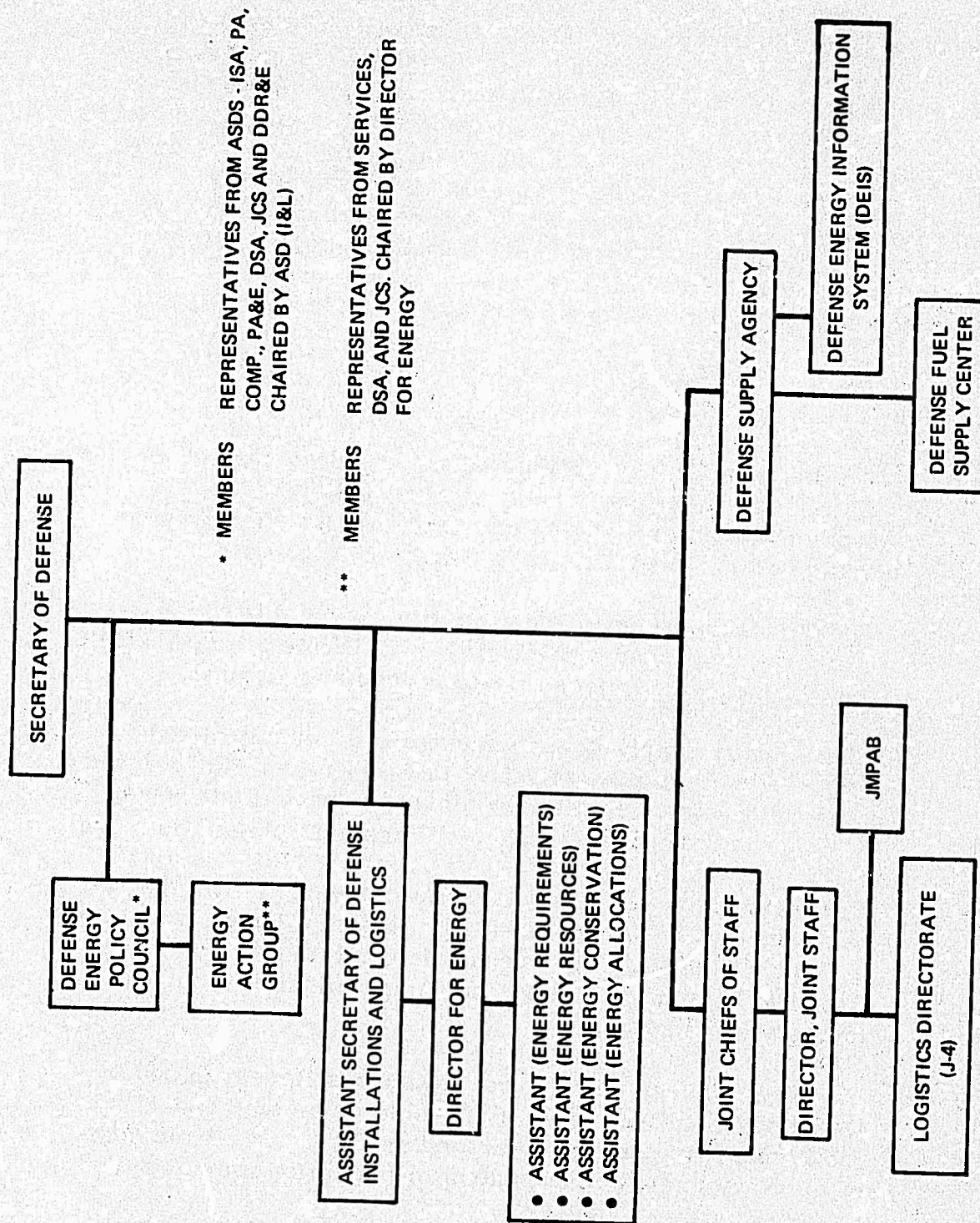
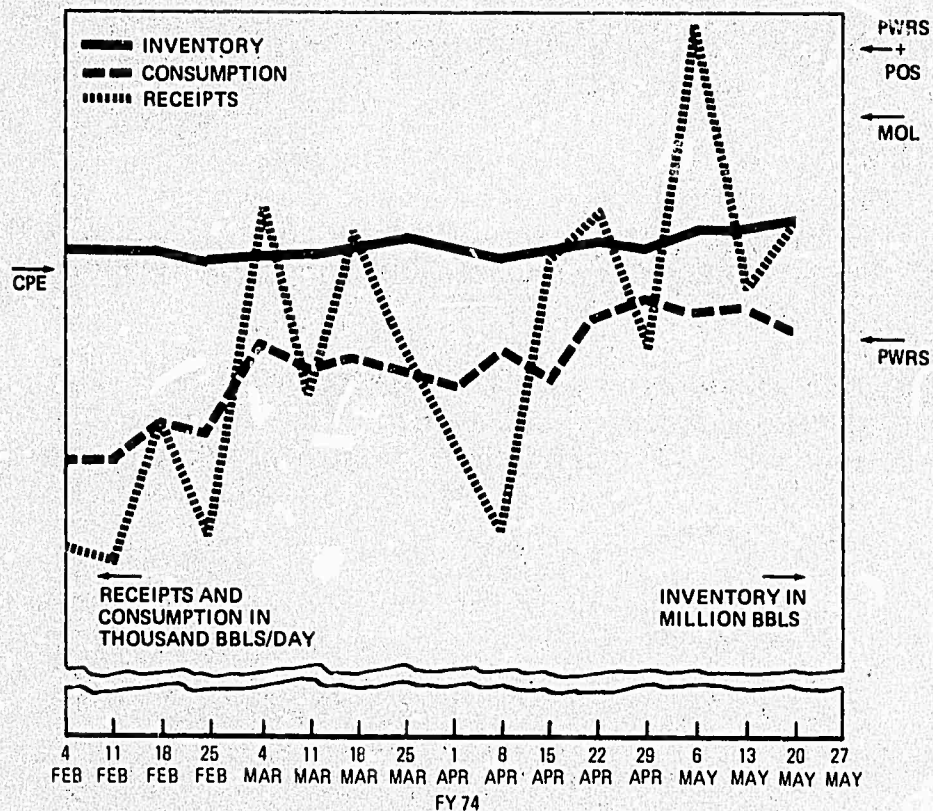


FIGURE 9. DOD ORGANIZATION FOR ENERGY MANAGEMENT



SOURCE: *Defense Management Journal*, Vol. 10, No. 3, July 1974.

NOTES:

Consumption Planning Estimate (CPE)—The estimated average daily consumption rate based on estimated requirements of the Military Services.

Prepositioned War Reserve Stock (PWRS)—Level of that portion of the mobilization reserve materiel which strategic plans dictate be positioned prior to hostilities at or near the point of planned use or issue. PWRS will ensure timely support of a specific project or designated force during the initial phase of operations before resupply shipments arrive.

Peacetime Operating Stock (POS)—Level of quantity which must be budgeted for to ensure the Minimum Operating Level is maintained.

PWRS plus POS—Ideal operating level.

Minimum Operating Level (MOL)—The average on-hand inventory required to sustain operations during hostilities before resupply shipments arrive and without drawing on the Prepositioned War Reserve Stock.

FIGURE 10. PRODUCT INVENTORY, CONSUMPTION, AND RECEIPT TRENDS

- A critical need exists for a fulltime focal point for energy R&D in the Office of the Director of Defense Research and Engineering.
- Continued development of DEIS is needed to correlate logistical and financial information on energy. This addition may be accomplished by direct inclusion of the data in DEIS or by establishing compatibility with other existing data bases.
- DSA should determine what measures, if any, should be taken to put DOD in a better position to cope with a renewed energy crisis in FY75 through interim improvements to the Integrated Material Management of Fuel by DSA (DFSC).
- Continued close coordination of DOD participation in inter-agency energy programs must be provided by the Directorate for Energy. To assist in this function, the military liaison billet in the FEO should be retained.

RECOMMENDATIONS

Recommendation 2/8-1

The Secretary of Defense should expand the membership of DEPC to include the Deputy Chiefs of Staff (Logistics) of the Army and the Air Force and the Deputy Chief of Naval Operations (Logistics).

Recommendation 2/8-2

The Director of Defense Research and Engineering should approve the appointment of a fulltime energy R&D coordinator on the staff of the Deputy Director (Research and Advanced Technology) at an early date.

Recommendation 2/8-3

The Directorate for Energy should continue the development of DEIS in conjunction with the Military Departments' logistical and financial information on energy.

Recommendation 2/8-4

DSA should provide an interim report by 1 September 1974, addressing what improvements should be made in the Integrated Material Management of Fuel to put DOD in a better position to cope with a possibly renewed energy crisis in FY75, and advise on progress in strengthening the management orientation of DFSC.

Recommendation 2/8-5

The Navy and the Air Force should review their headquarters energy management staffing patterns to ensure establishment of adequate levels of permanent duty personnel.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

A Defense Energy Task Group (DETG) was formed in September 1973 to conduct a comprehensive review and analysis of approaches for managing defense energy resources. The DETG report was submitted to the Assistant Secretary of Defense (Installations and Logistics) on 15 November 1973. Contained in the report were 57 specific recommendations dealing with the various aspects of the energy resource management problem.

In the 7 months that have passed since the DETG report was published, a number of major developments have occurred affecting the management of DOD energy resources:

- The nation has been subjected to a retaliatory embargo on crude petroleum shipments from the Organization of Arab Petroleum Exporting Countries (OAPEC)
- A Federal Energy Office (now the Federal Energy Administration) was created to deal with the energy supply shortage and particularly to administer the Mandatory Petroleum Allocation Program
- DOD, as did the nation as a whole, experienced difficulties in obtaining needed energy supplies.

Because of the dramatic changes that have occurred in the United States and the rest of the world, and because of the DOD energy situation, an update of the 15 November 1973 report is required at this time to:

- Summarize the significant progress made in carrying out the initial recommendations
- Analyze the evolving character of the DOD energy management problem

- Establish new directions for DOD energy policy for formulating new recommendations in selected energy management areas.

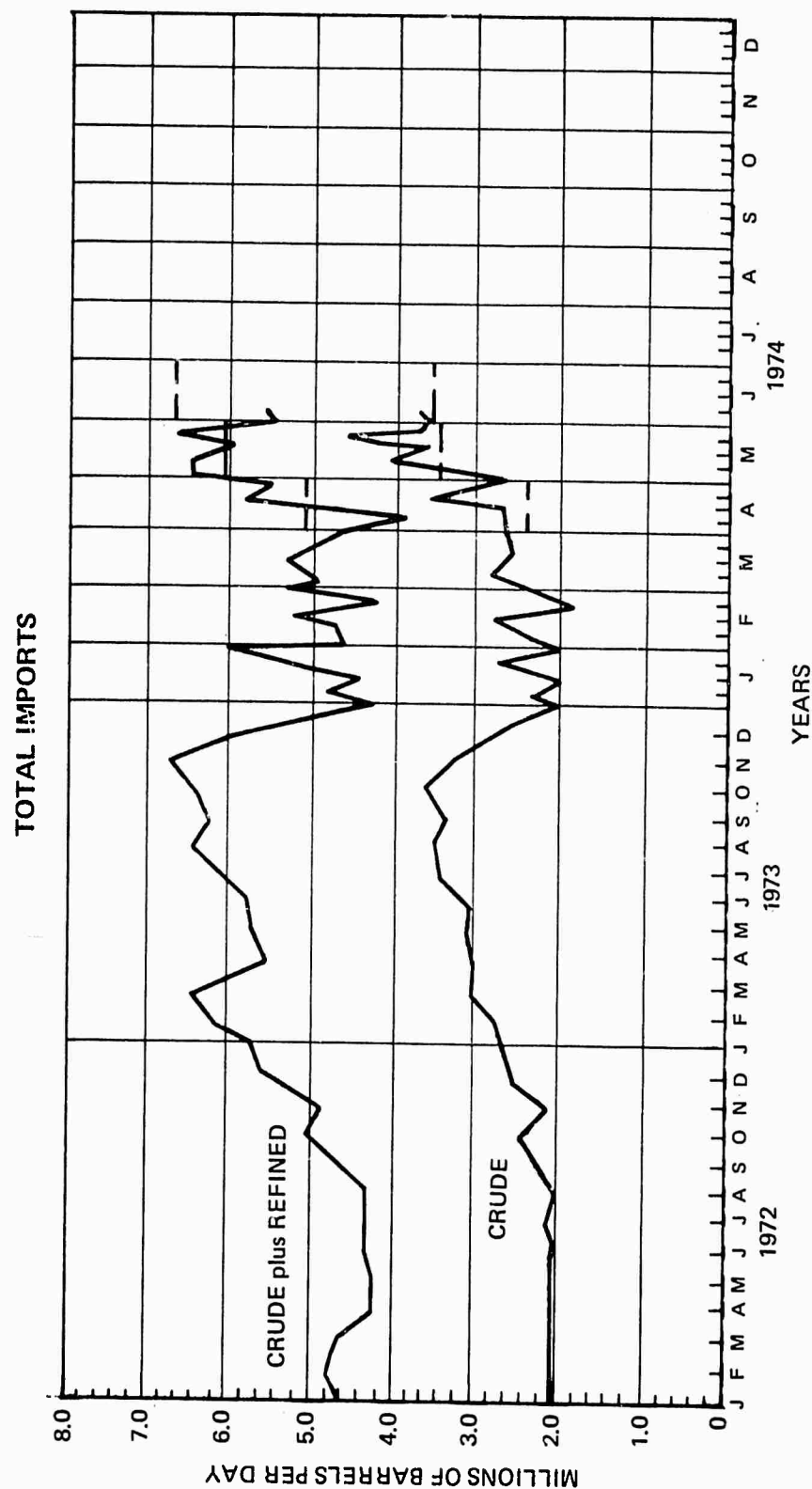
This report, Management of Defense Energy Resources — Phase II, is the product of that resolve. The following sections of this introduction present additional perspective on the evolving energy situation and serve as a background for the specific discussion of DOD energy management directions described in the body of the report.

1.2 THE WORLD ENERGY SITUATION

Energy supply problems have been a focus of world attention for the last 7 months. The embargo on crude exports to Western Europe and the United States from the OAPEC nations following the Mideast conflict of late 1973 led to severe mandatory curtailments of petroleum consumption throughout the Western World. Although several nations in Europe were more severely impacted by the embargo than the United States, imports to this country did drop significantly (Figure 1-1) leading to a supply shortfall estimated at about 10 percent.

The embargo was lifted in March 1974, but the restoration of Mideast oil flow will not necessarily ease the shortage of petroleum products in the long term. Rapid industrial growth and a rising standard of living, particularly in Japan and Western Europe, will probably continue to place increasing demands on the available world supply of crude, even if the OAPEC nations choose to return to earlier production levels. In view of the OAPEC nations' reported interest in conserving their resources, it appears that possible supply curtailments will continue to be an international concern.

A significant effect of the embargo was to accelerate the rapid rise in the price of crude oil and refined products (see Figure 1-2). In recent months, prices have stabilized but at levels far above pre-embargo rates. Some observers conclude that energy had been undervalued and that the new prices are realistic (even though they are substantially out of line with production costs and have led to substantial increases in the price of other energy commodities); other observers feel that the current high price of energy may lead to major economic dislocations. One thing is already clear—the price increases have led to very serious consideration of fuel substitutions and conservation measures.



SOURCE: FEO PETROLEUM SITUATION REPORT, 7 JUNE 1974 LEGEND: ——— FORECAST

FIGURE 1-1. U.S. OIL IMPORTS DURING ARAB OIL EMBARGO

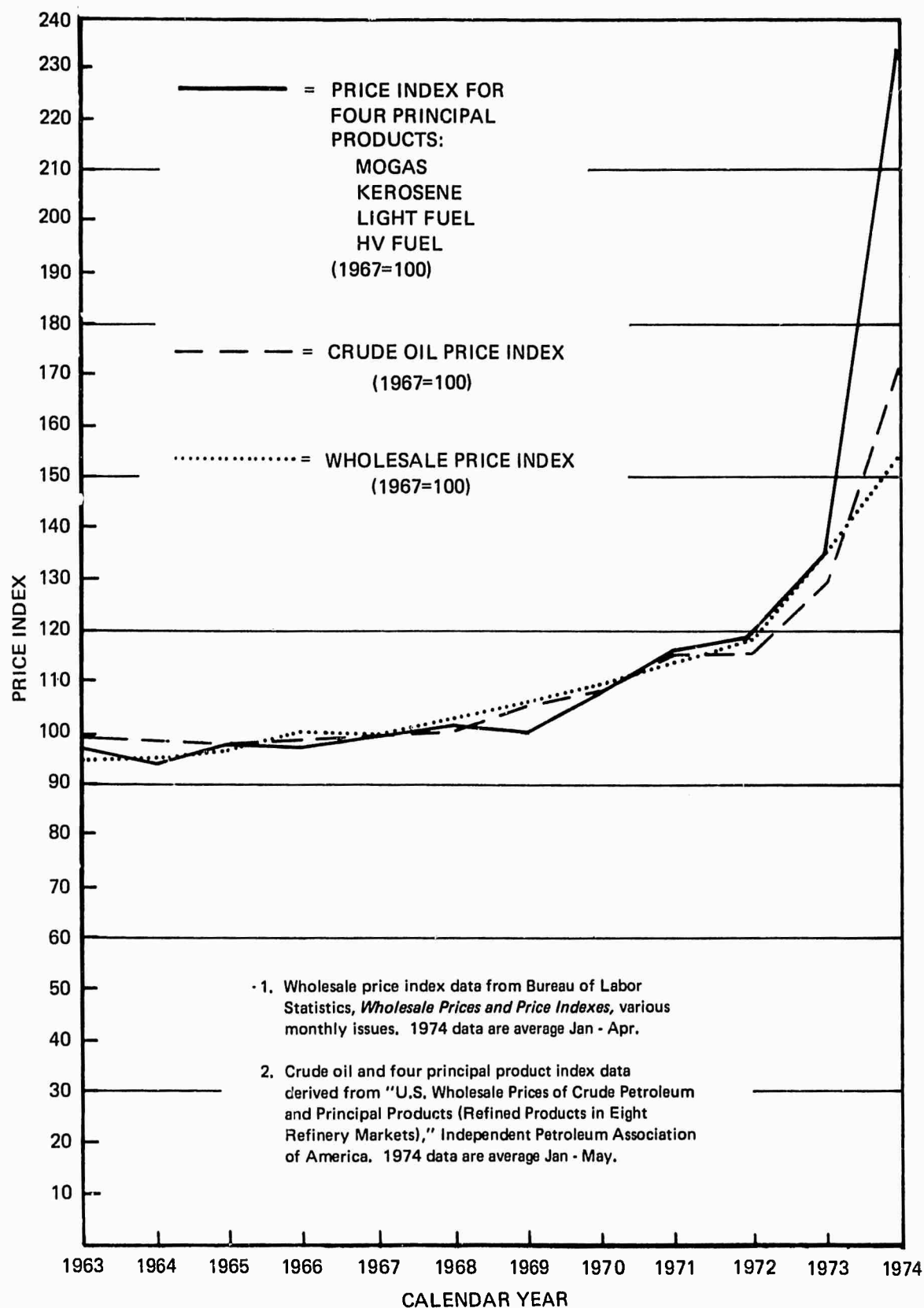


FIGURE 1-2 OIL PRICES VS. WHOLESALE PRICE INDEX
(1967 = 100)

The prospects include continued vulnerability to supply constraints and sustained high (and potentially fluctuating) prices for Mideast crude. These uncertainties have placed the United States under strong pressure to reduce its dependence on foreign imports and have caused DOD to reassess its policies of reliance on foreign commercial petroleum assets for overseas war reserves. The international trade deficit resulting from massive oil imports has made it increasingly important for the United States to further develop its coal resources and to continue vigorous pursuit of exploration activities in the offshore and Alaskan oil fields.

Price is a fundamental factor in determining how the United States should pursue an appropriate goal of energy independence. If international oil prices were to be significantly reduced, then many of the options for extraction of marginal resources and for the production of synthetic fuels that now appear attractive may become economically untenable. Unless protective tariffs, quotas, or price guarantees are established to ensure that projects initiated now on the presumption that oil prices will remain at 1974 levels or higher are not destroyed economically by calculated short-term decreases in the price of Mid-eastern oil, the risk associated with committing capital to such projects would be very great indeed.

1.3 THE UNITED STATES ENERGY SITUATION

As is evident from the preceding discussion, the U.S. energy situation is strongly dependent on the international energy market in petroleum. The OAPEC embargo had a major impact on oil supplies during the past winter and brought home the vulnerability of the nation to short-term supply disruptions. But there are other factors that must be considered as well in defining the U.S. energy situation today. The most important among these factors is the extent to which the nation can turn to an ever greater reliance on nuclear power and on its prodigious coal reserves. Perhaps the critical lesson of the embargo is that reliance on an insecure source of supply can be dangerous. Diversification of energy sources and the creation of protective cushions must surely be the hallmarks of future U.S. energy programs.

The Arab embargo plus growing domestic demand led to a peak shortfall during the winter of 1973-1974 of about 10 percent of total requirements. Much of this shortfall was absorbed through reduced production of gasoline, which led to acute consumer awareness of the energy "crisis." The gasoline situation was exacerbated by a diversion

of fuel oil into standby reserves in major industrial establishments, reserves that were maintained in anticipation of natural gas curtailments. The unusually mild winter of 1974 resulted in no extended gas interruptions and ensured that the available heating oil supplies were sufficient to meet demand. However, it was clear that, had the winter been severe, the dimensions of the crisis would have been significantly greater.

The petroleum supply shortfall has led a number of public utilities and industrial firms to convert their boilers to coal, a move that has been endorsed and encouraged by the Federal Government. Such conversions have increased the pressure on available supplies of coal, which, in turn, has driven marginal (or spot) prices from around \$10 or \$12 a ton to over \$30 a ton. Those industries that were subjected to price controls until 30 April 1974 found it difficult or impossible to compete in bidding for coal at this price. The situation was particularly severe in the case of metallurgical-grade coal for use in coke production.

Since the DETG report was prepared, the Federal Government has taken significant steps to develop an administrative capability to deal with energy policy issues. Initial efforts to form an energy policy body were made as early as the spring of 1973, but not until the reality of the embargo became apparent was the Federal Energy Office (FEO) created in December of last year. The principal mission and responsibility of the FEO during its first months was to formulate and implement allocation and conservation programs. A more permanent organization, the Federal Energy Administration (FEA), is now succeeding the FEO and has assumed a major role in both long- and short-range energy policy and planning.

One of the major programs now being considered by the FEO and other Federal Agencies is Project Independence. The goals for the project are now evolving, and the FEO has been charged with submitting a report on this matter to the President by November 1974. DOD is participating in this planning in areas of its interest through membership in appropriate interagency panels.

One important action taken to deal with the energy "crisis" of the past winter was the establishment of the Mandatory Petroleum Allocation Program. The concept of this program was to allocate available resources to end users in accord with a priority system. Efforts were made to ensure that allocations could be met by controlling the distribution of available crude among refiners and by specifying

refinery product stream mixes. Major end users were assigned distributors by FEO regional offices, and allocations were based on 1972 usage. When special cases of hardship resulted, the cases were reviewed individually and special dispensations were made. Some effort was made to establish price ceilings on petroleum products but as a general rule refiners and wholesalers were permitted to pass through to the consumer any increased costs incurred. Although the assignment of distributors under the Allocations Act was of major benefit to DOD (see Section 1.4), it was not the case universally. Many end-users found that their assigned distributors were unable to meet even their reduced allocations. These users were forced to seek supplies elsewhere and typically were obliged to pay premium prices for any fuel ultimately delivered. In retrospect, the allocation program was moderately successful only because the winter was mild and shortages hence were never really acute.*

During the last 7 months, there have been a large number of energy-related bills introduced into both houses of Congress, but for a variety of reasons not much of this legislation has been translated into law. Efforts to pass some form of wide-ranging energy emergency legislation have repeatedly been unsuccessful. Among the most significant pieces of energy legislation passed are the measures

- Directing the FEO to establish petroleum allocations
- Reducing speed limits on Federally funded highways to 55 miles per hour
- Creating the FEA.

In addition, a bill to create an Energy Research and Development Administration (ERDA) has passed the House and is being considered by the Senate. Of particular interest to DOD was the formation of a House Armed Services Special Subcommittee on Defense Energy and Resources under the chairmanship of Representative Otis Pike. This Subcommittee conducted hearings on all DOD energy matters in order to develop a position on the Naval Petroleum Reserves. The Subcommittee's report was issued on 20 June 1974.

*On 25 May 1974 the President directed that a plan be prepared for phasing out the Mandatory Petroleum Allocation Program.

The last 7 months have been a time of trial and of extraordinarily rapid change in the nation's energy situation. The situation has now eased, and it is appropriate to reflect on the successes and failures of measures taken and to consider the future course of events. Probably a major focus of attention in the near term will be on coal, an abundant energy resource but one that can only be exploited at significant economic and environmental cost. At the present time, operational mines and available supplies of equipment and skilled labor are not sufficient to meet potential demand growth. Major private investment in new coal mining capability will be slow in coming unless the return is guaranteed by long-term contracts at an acceptable price. The supply situation has been exacerbated by the recent closing of many small mines as a result of their inability to meet Federal mine safety standards. As a result of these factors and the possibility of a miners' strike in the fall, the opportunities to meet any significant percentage of the nation's energy supply deficit with coal in the near term appear to be limited. In the longer term, the production of synthetic fuels from coal appears to be an increasingly attractive option and one that is of considerable interest to DOD.

Prospects for early prototype demonstration of full-scale coal gasification facilities producing pipeline quality gas have improved significantly; however, the rising cost of coal may offset any long-term advantage accruing from this technique for coping with growing energy shortages. The attractiveness of alternative schemes for exploiting the oil bearing shales of the Green River Formation has also increased as a result of rising international prices for crude. In addition, exploration rates for oil and natural gas have increased recently. The key to success of all approaches to synthetics is some assurance of adequate return on the large-risk capital investments required.

1.4 THE DOD ENERGY SITUATION

The petroleum embargo and the rapid increases in the price of crude oil and refined products have had a significant impact on DOD energy management. The Defense Production Act was implemented in November 1973 to ensure that fuel requirements could be met. Later the Mandatory Petroleum Allocation Program served as the instrument for guaranteeing adequate supplies of fuel. Without the allocation program, DOD would have been unable to obtain requisite amounts of petroleum products in the open market. Historically, DOD

has been able to buy fuel that was generally part of excess production. With increased commercial demand, this excess production dwindled, and fuel suppliers were not willing to bid on DOD orders.

A similar supply problem was encountered with coal in late spring 1974. With utility conversions to low sulfur oil halted temporarily and with many oil users switching to coal, the demand for coal exceeded near-term production capacity. This situation led to a nearly threefold price increase and caused suppliers to bid only on those orders guaranteeing them maximum price with minimum inconvenience. Since there is presently no allocation program for coal, DOD has had severe problems in purchasing sufficient coal to meet its demands. If this situation does not ease, it will be necessary to invoke the Defense Production Act to obtain coal.

The severity of the fuel supply problems encountered by the Defense Supply Agency (DSA) is compounded by the fact that DSA buys fuel to heat all Government buildings operated by the General Services Administration. Hence, there was a very real prospect that without the allocation program, some Government buildings would have been without heat during the winter. Although on balance the mandatory allocations were beneficial from a DOD viewpoint, they were not without problems. For example, many DOD installations purchase fuel in quantities less than 84,000 gallons (2,000 barrels), and in these cases were classified as "end-users" rather than wholesale purchasers. Field units purchasing fuel through "bulletin contracts" were, therefore, often faced with constraints similar to those encountered by the individual consumer. More importantly, the use of mandatory allocation eliminated price competition among suppliers, resulting in some instances in higher costs for DOD.

The impact of price has been an important long-range consequence of the events that have taken place during recent months. More than any other factor, price may serve to dampen demand for energy in DOD and in the economy as a whole. As a result of escalating prices, DOD has had to request a supplement of almost \$1 billion to the FY74 budget. In FY75, an appropriation of about \$4.4 billion will be required for energy alone, representing about 4.5 percent of the DOD planned budget. Thus, the cost of energy is a major factor in DOD's programming.

A number of measures have been undertaken or carried out within DOD to address such problems:

- A Defense Energy Policy Council in OSD and a Directorate of Energy supported by an Energy Action Group were established to coordinate DOD actions to meet the energy supply crisis and to work with the FEO
- Modifications have been made to the Federal Allocation Program that are expected to ease DOD petroleum supply problems, and OSD has initiated recommendations for its continued application for national defense purposes
- A JCS review of war reserves has been initiated to assess the degree to which dependence of overseas forces on foreign fuel supplies should be reduced
- A major DOD energy conservation effort has been undertaken with the theme "Save Defense Energy" (see Figure 1-3); through dedicated efforts at the OSD and Service levels, significant reductions in energy consumption have been achieved
- A Defense Energy Information System (DEIS) has been established to facilitate effective control management and visibility of available DOD fuel resources domestically and abroad
- Energy R&D planning is being integrated with the national effort through Office of Management and Budget and FEO Project Independence activities.

1.5 DOD ENERGY MANAGEMENT: NEW GOALS AND DIRECTIONS

Each of the topics introduced in the preceding discussion is treated in greater detail in the remainder of this report. Chapters 2 through 8 deal with:

- Defense Energy Requirements and Budget Impact (Chapter 2)
- Petroleum Storage and Distribution (Chapter 3)
- Flexibility in Fuel Selection (Chapter 4)



FIGURE 1-3. DOD ENERGY CONSERVATION POSTER

- Naval Petroleum and Oil Shale Reserves (Chapter 5)
- Defense Energy Conservation (Chapter 6)
- Energy Research and Development (Chapter 7)
- Organization and Management (Chapter 8).

A classified supplement is presented as a separate chapter. Each chapter presents first a review and analysis of the progress that has been made on the DETG recommendations of 15 November 1973. Major events that have altered the situation in the last 7 months are then discussed, and new issues and problems identified. At the conclusion of the chapter is a presentation of new recommendations for action based on the current requirements for DOD energy management. The numbers of these new recommendations are prefixed with a "11" to distinguish them from those made in the DETG report of 15 November 1973.

CHAPTER 2

DEFENSE ENERGY REQUIREMENTS AND BUDGET IMPACT

2.1 INTRODUCTION

This chapter reviews defense energy requirements and the budget impact of these requirements. The chapter is divided into four sections:

- Status of recommendations
- Updated information
- Conclusions
- Recommendations.

2.2 STATUS OF DETG RECOMMENDATIONS

In this section, the status of the four recommendations made in the requirements and budget impact chapter of the DETG report is summarized.

2.2.1 Recommendation 2-1

The Department of Defense should continue to use the Matrix II baseline to report progress to the Department of the Interior under the Presidential conservation program.

The Matrix II* baseline is currently in use after being revised to improve accuracy. Table 2-1 shows the revised baseline data, which represents FY73 consumption less overseas installation and credit-card-type purchases. Quarterly performance reports were made in this format in FY74. The format is being changed further,

*Matrix II is the Department of the Interior reporting system (now managed by the Federal Energy Office) whereby each Federal Agency reports its FY73 baseline for energy consumption and against which Federal Energy Reduction Program progress is measured.

TABLE 2-1

DEPARTMENT OF DEFENSE MATRIX II FY73 BASELINE DATA
(REVISED)
FEBRUARY 15, 1974*

<u>Installations (CONUS)</u>		<u>1st Quarter FY73</u>	<u>2nd Quarter FY73</u>	<u>3rd Quarter FY73</u>	<u>4th Quarter FY73</u>	<u>Total FY73 Consumption</u>
Purchased Electrical Energy	Mwh x 10 ⁶	5,801,181	5,033,540	5,066,508	5,266,900	21,168,120
Natural Gas & Propane	Btu x 10 ⁶	20,048,193	38,497,253	47,373,192	28,701,492	134,620,130
Fuel Oil	Btu x 10 ⁶	13,118,832	35,166,856	48,761,865	25,613,483	122,661,036
Coal	Btu x 10 ⁶	7,998,593	14,628,367	16,103,001	9,173,694	47,903,655
Purchased Steam & Hot Water	Btu x 10 ⁶	131,183	450,004	536,831	321,908	1,439,926
<u>Mobile Operations (Worldwide)</u>						
Aircraft Operations	bbls a/c fuels	45,420,626	44,993,417	41,850,292	41,600,791	173,865,126
Ship Operations	bbls steaming fuels	11,532,000	11,533,000	11,532,000	11,532,000	46,129,000
Ground Equipment Operations						
	bbls distillate	2,659,019	3,477,395	3,617,112	2,913,691	12,667,217
	bbls gasoline	1,947,984	1,998,317	1,974,024	2,024,438	7,944,763

*Excludes sales of petroleum products to other agencies.

however, in order to interface more effectively with the Defense Energy Information System (DEIS, see Section 2.2.2) and to reflect worldwide operations. The new reporting format will be effective starting with the first quarter of FY75. The DEIS format continues to segment installation and mobile operations, yet provides additional information on specific fuel types for mobile operations.

2.2.2 Recommendation 2-2

The Assistant Secretary of Defense (Installations and Logistics) should develop improved energy data reporting procedures to provide better visibility to the total DOD energy requirements and its cost.

The Assistant Secretary of Defense (I&L) approved the establishment of the Defense Energy Information System (DEIS) on 10 December 1973. The first weekly report was received on 20 December 1973. This report (DEIS-I) has undergone several modifications and is now providing with reasonable reliability weekly basic data, on petroleum products, consumption (previous week and anticipated) inventories, and receipts. Additional fuels were included in later versions of DEIS. For example, DEIS-II provides additional monthly information* on electricity, propane, steam/hot water, and natural gas by FEA region/CINC.

2.2.3 Recommendation 2-3

The Assistant Secretary of Defense (Comptroller) should be prepared for an escalation of operations and maintenance (O&M) expenditures in FY74 owing to projected increases in the price of energy.

In February 1974, \$455.4 million was included in the FY74 Readiness Supplemental Appropriation Request for the anticipated impact of fuel contracts to be awarded, based on 1 February 1974 standard fuel prices. After House markup, the April DOD request to the Senate was increased to \$561.7 million, which included an appeal for additional funds as a result of restoration of cuts as well as new

*Monthly intervals were selected because of the common practice of monthly utility billing.

price increases. Final action by Congress on 5 June 1974 resulted in approval of a \$473.7 million supplement to the FY74 appropriation. The portion of that amount to be allotted to fuel was to be determined by the Military Departments. When added to the supplemental approved in the summer of 1973, the total FY74 supplemental for petroleum price increases amounted to almost \$1 billion.

2.2.4 Recommendation 2-4

The Assistant Secretary of Defense (Comptroller) should adjust the FY75 budget and out year programs to reflect current projections of rising energy costs for utilities as well as POL.

The President has approved and submitted to the Congress a FY75 budget amendment that includes \$894.5 million in additional funds to cover the 1 April standard price increase. Table 2-2 provides the appropriation distribution of the amendment. As part of the review of the FY75 financial plan ASD(C) is identifying differences in funding utility costs arising from known rate increases and will make necessary adjustments to cover uncontrollable costs.

2.3 UPDATED INFORMATION

This section contains more recent information on the subjects addressed in the DETG report:

- DOD energy requirements
- Impact of DOD requirements on total market
- Availability of energy to meet DOD requirements
- Impact of rising prices on DOD budget.

2.3.1 Energy Requirements

Table 2-3 summarizes DOD projected consumption of energy for FY75. Service forecasts for consumption of installation fuels show that some growth is anticipated compared to FY73 (see Table 2-1) because of the addition of new energy-intensive facilities, and the expectation of a normal rather than a mild winter. It appears that significant savings in the installation sector will require a modest retrofit investment designed to improve facility energy efficiency, and it is intended that funds for such investments will be included in budget submissions for FY76.

TABLE 2-2

DEPARTMENT OF DEFENSE FY75 BUDGET AMENDMENT POL COST INCREASES
(Dollars in Millions)

	FY75 Direct Costs			Tariff Rate Increase*	Total Increase
	President's Budget	Amended Budget	Increase		
O&M, Army	201.7	236.8	35.1	149.2	184.3
O&M, Navy	677.1	942.5	265.4	54.3	319.7
O&M, Marine Corps	16.6	20.0	3.4	4.9	8.3
O&M, Air Force	1,077.3	1,306.0	228.7	75.6	304.3
O&M, Defense Agencies	11.7	11.7	-	-	-
O&M, Army Reserve	6.6	6.7	.1	-	.1
O&M, Navy Reserve	33.5	41.1	7.6	-	7.6
O&M, Marine Corps Reserve	.7	1.0	.3	-	.3
O&M, Air Force Reserve	21.4	27.9	6.5	2.5	9.0
O&M, Army National Guard	21.2	21.2	-	-	-
O&M, Air National Guard	87.0	112.3	25.3	-	25.3
Subtotal, O&M	2,154.8	2,727.2	572.4	286.5*	858.9
Military Personnel, Army				10.5	10.5
Military Personnel, Navy				13.1	13.1
Military Personnel, MC				1.5	1.5
Military Personnel, AF				10.5	10.5
Subtotal, Military Personnel				35.6	35.6
Total, Department of Defense	2,154.8	2,727.2	572.4	322.1	894.5

* Increases in Military Airlift Command and Military Sea Lift Command industrial funds to cover increased fuel costs.

NOTE: Table 2-5 outlines the totals involved in FY73, 74, and 75 as adjusted upward by previous supplementals and this amendment.

TABLE 2-3

FY75 PROJECTED FUEL CONSUMPTION¹

Installations	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Electricity (mwh) (mbtu) X11.6M	7,264,248	6,248,741	6,320,239	6,326,575
Heating Fuel (bbls) (mbtu) X5.8M	84,265,276	72,485,395	73,315,000	73,389,000
Propane Gas (mbtu)	4,154,539	8,705,689	12,054,801	5,823,103
Natural Gas (mbtu)	24,096,326	50,493,000	(9,918,000)	33,774,000
Coal (mbtu)	416,000	843,000	991,000	633,000
(tons)	18,469,000	30,936,000	39,078,000	24,189,000
Steam/Hot Water (mbtu)	8,141,000	17,635,000	20,457,000	1,163,000
	328,738	710,088	823,500	450,390
	189,000	535,000	687,000	355,000
Mobile Operations				
JP-4 (bbls) (mbtu) X5.3M	30,480,737	29,234,402	29,386,030	31,145,225
JP-5 (bbls) (mbtu) X5.7M	161,547,900	154,889,330	155,745,950	165,070,000
AVGAS (bbls) (mbtu) X5.3M	7,390,945	7,348,334	7,333,982	7,378,959
MOGAS (bbls) (mbtu) X5.3M	42,128,386	41,885,503	41,804,000	42,049,000
Other Distillates (Less Heating) (bbls) (mbtu) X5.8M	1,368,415	1,311,838	1,311,343	1,336,636
	7,252,600	6,982,741	6,950,000	7,084,000
	1,783,824	1,781,078	1,756,057	1,825,173
	9,454,267	9,174,713	9,307,000	9,673,000
	7,638,229	7,369,676	7,300,318	7,639,310
	44,301,728	42,744,120	42,342,000	44,308,000
Other Residuals (Less Heating) (bbls) (mbtu) X6.3M	873,705	872,995	873,594	872,760
Total Petroleum (bbls)	5,504,342	5,498,868	5,504,000	5,498,000
Average BPD ²	53,690,394	56,564,012	60,016,125	56,019,166
	583,591	614,826	666,845	615,595
Grand Total All Products (mbtu)	405,765,825	434,073,670	466,098,950	417,185,000

NOTES:

¹ Includes worldwide requirements and credit-type, into-plane, and bunkering purchases, but excludes "Sales to Others" (average = 14,000 BPD).

² Average BPD for FY75 = 620,000. When "Sales to Others" are added, it becomes 634,000 BPD.

DOD petroleum consumption trends are shown in Figure 2-1. Decreased fuel availability and increased fuel costs have encouraged commanders to deal with the realities of the current energy situation personally and forcefully. As a result, it is estimated that DOD FY75 petroleum requirements will be approximately 15 percent below FY73 consumption, averaging about 620,000 barrels per day (excluding sales to others, which are expected to bring the total to 634,000 BPD). Although consumption during the first three quarters of FY74 was below this projection, these earlier consumption rates are not considered to be valid for forecasting purposes, since supply and funds during this period were severely constrained in some instances and operational training was deferred. (For a discussion of FY74 consumption and conservation measures, see Chapter 6.)

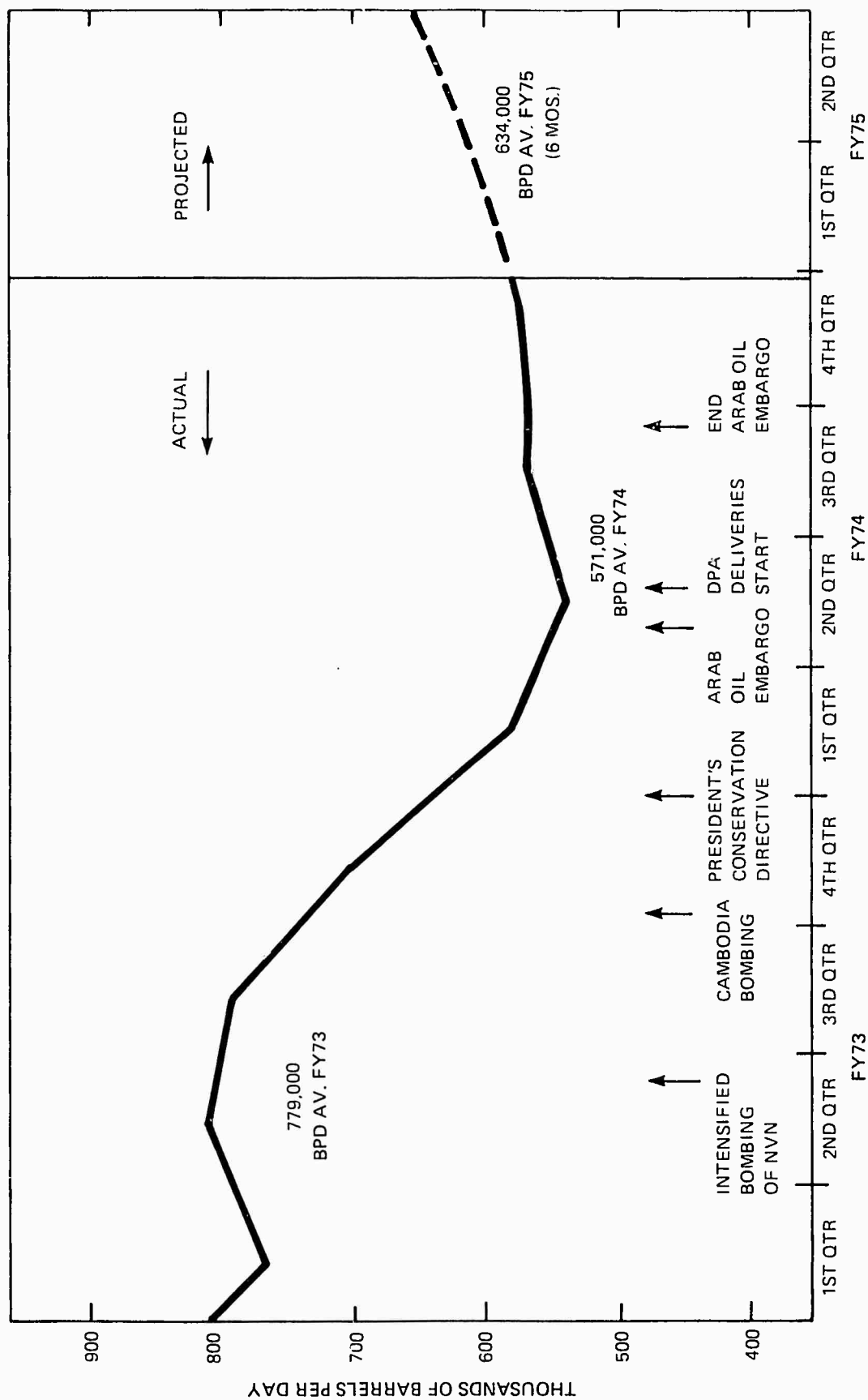
It should be noted that the consumption trends portrayed in Figure 2-1 include sales to others, which are estimated to be about 14,000 BPD in FY75. Sales to others include:

- All fuels sold to activities other than the United States Army, Navy, Air Force, and Marine Corps
- Fuels supplied or sold to a consumer through the Military Assistance Service Funded program, Military Assistance Program, or exchange programs.

Therefore, the definition "others" includes foreign friendly governments, and other agencies or activities of the U. S. Federal Government. *

During FY73, sales to others averaged 52,000 BPD. In the first half of FY74, sales to others averaged 35,000 BPD including sales and transfers to the nations of Southeast Asia (SEA). As a direct result of the Arab oil embargo against the United States and its impact on supplies to SEA countries, direct contracts were initiated by South Vietnam, Cambodia, and Laos with foreign suppliers for their military fuel requirements. Since these contractors started making direct deliveries on 1 January 1974, sales to others during the second half of FY74 decreased.

*Sales to others do not include fuel purchased for other agencies of the U. S. Government by the DOD under its responsibility as centralized procurement agent.



*INCLUDES "SALES TO OTHERS":

FY73 52,000 FY74 27,000 FY75 14,000

21 MAY 74

FIGURE 2-1. DOD PETROLEUM CONSUMPTION TRENDS*

2.3.2 Impact of DOD Requirements on Total U.S. Market

About 2.2 percent of total U.S. energy is consumed by DOD and about 85 percent of total Federal Government energy. Petroleum products account for about 73 percent of DOD energy consumption when measured in Btu's.

It is estimated that DOD FY74 consumption will average about 3.4 percent of U.S. total petroleum consumption. This figure is well below previous consumption percentages, which ranged from 5.7 percent in FY49 to 7.7 percent in FY69. Since 1969, DOD petroleum consumed as a percent of total U.S. consumption has been dropping dramatically, and had reached a previous low of 4.3 percent in FY73.

Since the late 1960's, the fraction of petroleum procured from foreign sources was nearly 50 percent. During the recent Arab nation oil embargo, however, the fraction of petroleum products procured from foreign sources dropped to as low as 10 percent of requirements, and the Defense Production Act and mandatory petroleum allocations had to be invoked to ensure adequate supplies from within CONUS. For FY74, approximately two-thirds of DOD petroleum products will have been supplied from within CONUS primarily because of withdrawal of forces from Southeast Asia.

2.3.3 Availability of Energy To Meet DOD Requirements

2.3.3.1 Procurement of Petroleum

During the first 6 months of FY74, DSA experienced serious shortages in contractual coverage particularly in CONUS. Throughout this period, procurement shortfalls of domestic ground products and jet fuels persisted. Followup solicitations and receipts of over 5 million barrels of jet fuel under the Voluntary Allocation Program increased overall JP-4 coverage to 85 percent and JP-5 to 73 percent, leaving an uncovered balance of over a million barrels.

In contrast, the beginning of FY74 found no serious overall shortages of either ground products or other bulk fuels in the overseas areas. However, during the second quarter of FY74 there occurred a drastic change in the supply situation, aggravated by the Arab oil embargo. When crude oil producing countries announced in October their intention to start a phased reduction in crude oil deliveries,

uncertainty was generated among overseas suppliers as to their ability to maintain uninterrupted supply under existing contracts to DOD activities. With the embargo of Arabian crude placed against the United States, the end of November found the situation even more critical. By the end of December, overseas bulk petroleum contract support had been substantially reduced. To ensure adequate petroleum supplies for DOD, the Defense Production Act and mandatory petroleum allocation had to be used as described below:

- Defense Production Act (DPA)

The prevailing general shortage of petroleum throughout the world made it impossible to obtain DOD minimum essential supplies without the use of DPA; therefore, letters were forwarded by the Department of the Interior to 22 United States oil companies having access to coastal terminals requiring that they provide to DOD a total of some 19 million barrels of jet fuels and other bulk products under DPA. It should be noted that a request for such action had been initiated by DOD in September 1973 well before the embargo was imposed. Negotiations began on 25 November 1973. Problems to be resolved with suppliers included their obtaining necessary storage facilities for products not ordinarily refined by them, obtaining the necessary component materials, developing Military Sealift Command (MSC) tanker schedules to conform to refining schedules, and minimizing the impact of supply of these DPA quantities on the suppliers' commercial business. Fuel obtained under DPA was to meet DOD requirements for the period 1 November 1973 through 31 December 1973, and directives to suppliers stipulated that not more than 30 percent of the deliveries could be carried over to 31 January 1974. Actual deliveries of fuel, however, extended well into February and March, as shown in Figure 2-2, and it was not until 31 March 1974 that deliveries were essentially completed. Approximately half of the petroleum products obtained from domestic sources under DPA were used to replace overseas supplies that were not delivered because of the Arab oil embargo.

During the first half of FY74, particularly during delivery of products under DPA, an industrywide shortage of Fuel System Icing Inhibitor (FSII) also impacted on the delivery of jet fuels. Some refiners were unable to obtain an adequate

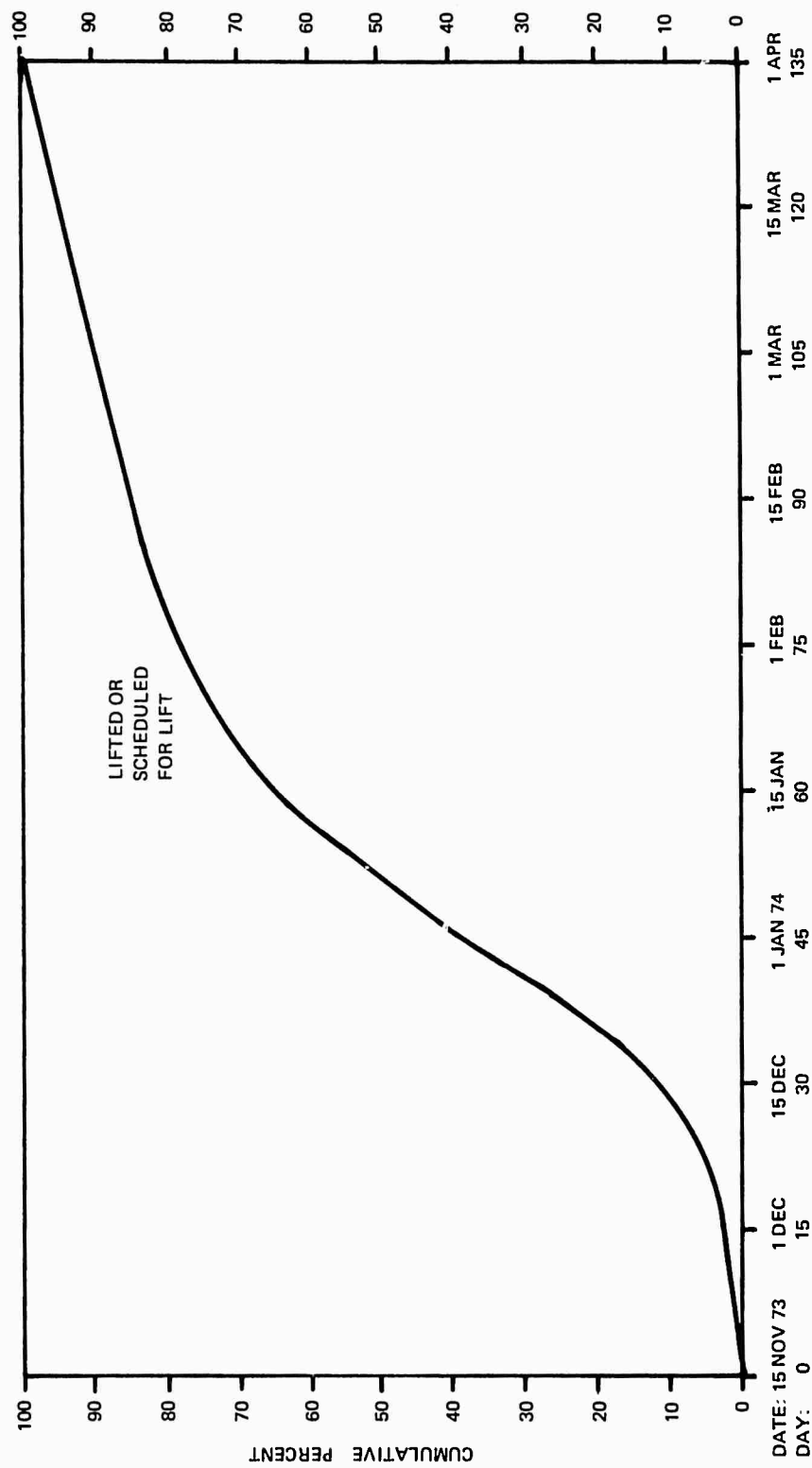


FIGURE 2-2. DEFENSE PRODUCTION ACT LIFTING PROFILE FOR
BULK PETROLEUM PRODUCTS

supply of FSII, which resulted in delays in delivery. In some instances, storage facilities were filled and MSC ships delayed by a lack of FSII.

There are presently some 6 major suppliers of FSII in the United States and a few overseas suppliers. The Military Services use approximately 200,000 barrels of FSII annually.

Mandatory Petroleum Allocation Program

The Emergency Petroleum Allocation Act of 1973, enacted on 27 November 1973, directed the President to promulgate regulations providing for the mandatory allocation and pricing of crude oil, residual fuel oil, and refined petroleum products. All the authority vested in the President by this Act was delegated to the Administrator, FEO, on 4 December 1973 by Executive Order 11740. The same Executive Order also delegated to the Administrator authority vested in the President by DPA as it relates to the production, conservation, use, control, distribution, and allocation of energy. Beginning on 1 January 1974, DOD requirements for petroleum from domestic sources have been supplied through the Mandatory Petroleum Allocation Program administered by the Federal Energy Administration Office. On 2 January 1974, the ASD (I&L) transmitted requirements to the FEO totaling 57.3 million barrels for the January-March 1974 period, which had to be allocated from domestic sources. In addition, 8.9 million barrels were requested for reconstitution of depleted inventories; FEO promptly allocated the quantity for daily consumption but deferred action on reconstitution of inventories. During the January-March period the worldwide DOD petroleum inventory remained constant at about 75 million barrels. On 19 March 1974, a DOD requirement of 36.1 million barrels from U. S. domestic sources for April-June quarter was transmitted to FEO. The domestic source requirements were reduced to 29.9 million barrels when increasing foreign oil became available after the embargo was lifted. Also, increasing availability of petroleum overseas made it possible to begin rebuilding inventories.

In early June 1974 the FEO initiated studies for early phase out of the Mandatory Petroleum Allocation Program,

which is scheduled to expire in any event in February 1975. If such suspensions are effected, DOD may have to seek again the use of DPA to avoid shortfalls in essential supplies.

A long-term petroleum availability problem for DOD occurs in jet fuel procurement, because DOD consumption of these levels is high in proportion to total U.S. consumption. Military demand for JP-4 and JP-5 combined in FY74 is projected to be 27 percent of the total United States demand for jet fuels. Therefore, DOD faces long-term competition from the airlines for jet fuels. This problem is discussed further in Chapter 4.

2.3.3.2 Procurement of Coal

DOD has recently encountered severe difficulties in obtaining contract coverage for coal. Annual DOD requirements in the United States are about 2 million tons, including 400,000 tons used in Alaska. In addition, almost 700,000 tons are bought annually in the United States for military installations in Europe. The U.S. coal industry produces some 600 million tons per year, of which military consumption represents less than half a percent.

At the end of the first half of FY74, DSA had obtained contract coverage for only 20 percent of requirements. During the third quarter, no bids were received until the Cost of Living Council decontrolled coal prices in March, securing at the same time voluntary agreements from the two major historical suppliers to DOD to offer coal to the Federal Government. By the end of May most of the contractual shortfall in coal had been covered, but it appeared that DPA might have to be invoked to meet the remaining DOD requirements. Therefore, the ASD(I&L) has approved the following courses of action:

- DOD will request FEO to use DPA to satisfy any remaining essential DOD requirements for coal (requirements for a reserve coal supply for installations that can burn oil are not considered essential)
- DOD will send to the Cost of Living Council copies of contracts for coal that resulted from the recent price decontrol action; also included will be data on prices

paid and signed statements by the coal companies saying that they are abiding by the voluntary commitments that they made to the Cost of Living Council

- DSA will attempt to secure long-term commitments on availability of coal even though contractual arrangements on prices may be on a short-term basis
- DOD installations that now have a 100 percent capability to burn oil as well as coal will be directed to use oil until further notice*
- DOD will clarify previous guidance to indicate that all new facilities that have a plant output of 150 million Btu or more per hour or an individual boiler with an output of 100 Btu or more per hour must have a dual capability to burn coal or oil*
- DOD will issue guidance to suspend affected portions of any MILCON projects involving conversion of oil to coal*
- DOD will recommend that the FEO investigate acquisition by the Federal Government of a coal-producing facility, either directly or indirectly, to satisfy its coal requirements.

2.4 IMPACT OF RISING PRICES ON DOD BUDGET

As discussed in Section 2.2 and 2.3, the rise in fuel costs has had substantial impact on the budget for DOD energy. For FY74, the two supplemental requests for petroleum alone amounted to almost \$1 billion, and for FY75 the unbudgeted increase is \$894.5 million. These estimates are made using consumption levels expected during the periods, and, therefore, include savings from conservation. Because of the rapid price fluctuations for petroleum products, the projected increases are undergoing continual evaluations and will be revised as more accurate information becomes available.

*Subject to review and approval by FEO.

Since petroleum products represent approximately 72 percent of DOD energy consumption, price increases in these products have the greatest impact on the budget. The prices paid by DSA for petroleum during the third quarter of FY74 ranged from 17 to 47 cents per gallon, averaging \$13.19 per barrel. The standard prices paid by DOD agencies for petroleum products are based on DSA computations. The standard price consists of five elements: product, transportation, services, wholesale losses and retail losses. Standard prices are reviewed quarterly. Changes in prices are made after price stability and financial breakeven positions are considered. The objective of standard price use is to maintain a stock fund within a \$10 million gain or loss position at the end of the fiscal year. The initial pricing policy established by an ASD(C) memorandum of 22 December 1972 was that price changes for bulk petroleum products would be made annually unless an emergency situation required an interim change. Based on this policy, DSA requested \$469.3 million cash by letter on 2 March 1973 for losses that would occur during FY74. OSD annual pricing policy was revised by a second ASD(C) memorandum of 18 May 1973 to provide for recovery of losses by adjusting prices within FY74.

Estimated prices to be effective 1 January 1974 were provided to the Military Services on 11 December 1973. Because of late award of contracts, a price study could not be made until January 1974, which required price changes to be effective 1 February 1974. The 1 February 1974 standard prices were established with the objective of reaching a financial breakeven position on 30 June 1974 for each product. This breakeven position considered any gain or loss through January 1974 and also the reevaluation of inventory resulting from price changes. A price study was made during March 1974. Price revisions required by this study were effective 1 April 1974 with a new breakeven position established for 31 March 1975. The Military Services were advised to ~~use the 1 April 1974 prices for revision of the FY75 Operating Budget/~~ Apportionment Request. A price study conducted in June 1974 to establish 1 July 1974 standard prices concluded that 1 April standard prices would not be altered at that time. A major objective is to maintain stability of standard prices because of their impact on the Services' O&M funds. Table 2-4 is a history of price changes since integrated management of bulk petroleum was established.

Estimates for future oil prices are, of course, varied. In the United States, the price of Persian Gulf oil is now approximately \$11 per barrel, down from highs of \$17 per barrel at the peak of the petroleum shortage. Although the current price is down from the peak,

TABLE 2-4

PETROLEUM, OIL, AND LUBRICANTS PRICE ESCALATION HISTORY
(Dollars Per Barrel)

Product	Designation	1 Jul 1973	Adj*	1 Jan 1974	Adj*	1 Feb 1974	Adj*	1 Apr 1974 and 1 July 1974
Jet Fuel	JP-4	6.26	+5.37	11.63	-	11.63	+3.24	14.87
Jet Fuel, Navy	JP-5	6.80	+3.70	10.50	+ .71	11.21	+3.07	14.28
Aviation Gas	115/145	11.09	-	11.09	-	11.09	+4.32	15.41
Navy Black Oil	NSFO	3.85	+3.65	7.50	+2.65	10.15	+4.79	14.94
Diesel Fuel, Heating Fuel		6.85	+1.55	8.40	-	8.40	+6.17	14.57
Navy Distillate	ND	5.54	+4.46	10.00	+2.04	12.04	+3.46	15.50
Motor Gasoline	MG-1	7.35	+2.94	10.29	-	10.29	+3.78	14.07

*Adj = Adjustment

it is in excess of twice the pre-embargo price of a year ago (\$4.65). Experts disagree when predicting the future prices of Persian Gulf crude oil. Some believe a drop of \$1 to \$4 per barrel could occur by the end of the calendar year, while others believe that prices will stabilize near their present levels by the end of 1974 and will be escalated thereafter by inflation.

A graph comparing price indices for petroleum products and crude oil to the wholesale price index was presented earlier in Figure 1-2.

Petroleum price increases will be accompanied by utility price increases as a result of the rising cost of all fuels. Under current budgetary and accounting procedures, there is little visibility for energy costs in FY74 and FY75 for purchase of electricity, steam, hot water, and other utilities. Accordingly, the impacts of utility price increases were estimated and these estimates are shown in Table 2-5.

2.5 ECONOMIC ANALYSIS OF PETROLEUM PROCUREMENT

At present, domestically produced crude oil is on a two-tier price basis: "old" oil, currently controlled at \$5.25 per barrel, is the amount that was produced from an oil property in 1972; any amount produced above that 1972 figure is considered "new" oil that can be sold at the free-market price, currently about \$10 per barrel. About 70 percent of domestic crude oil production is under price controls at this time.

Foreign crude oil prices have increased 300 to 400 percent during FY74. During the Arab oil embargo, crude oil prices were extremely volatile but appear to be stabilizing at about \$12 per barrel.

The composite price of petroleum products in the United States reflects a weighted average of "new," "old," and foreign crude oil prices plus additional costs such as transportation and refining. The future trend of this composite price is unclear. The increasing volume of "new" oil relative to "old" oil will tend to move domestic prices in the direction of world market prices. However, foreign crude oil prices bear little relation to production costs and are subject to wide fluctuations and manipulation for political purposes.

TABLE 2-5
POTENTIAL IMPACT OF RISING PRICES ON DOD ENERGY COST
(Dollars in Millions)

PETROLEUM*	FY73 <u>1,381</u>	FY74 <u>2,204**</u>	EST. FY75 <u>3,576.7†</u>
NON-PETROLEUM	497	657	819.4
TOTAL	1,878	2,861	4,396.1
% INCREASE OVER FY73		52%	134%

WEIGHTED AVERAGE

COST PER BARREL
% INCREASE IN AVERAGE

4.94 11.08 14.86

COST PER BARREL OVER FY73

124% 200%

*All end uses, including bulk, post, camp, and station fuels, and transportation of personnel and material.

**Based on DOD Average Daily Consumption of 544,000 barrels (199 million barrels per year).

†Based on DOD Average Daily Consumption of 620,000 barrels (226.3 million barrels per year).

10 June 1974

Before the recent use of DPA and mandatory petroleum allocations, awards were made for support of domestic DOD fuel requirements on a competitive basis (adjusted for Small Business set-asides). Each requirement was matched with a supplier who could provide the lowest cost of delivered product. Under today's conditions, procurement in the domestic petroleum market is by directive and without competition.

A recent economic analysis of petroleum procurement by DSA examined three alternative courses of action: (1) to make maximum purchases in the continental United States; (2) to make maximum purchases overseas; and (3) to purchase domestic requirements in the United States and overseas requirements overseas. Under prices prevailing in May 1974, Alternatives (1) and (3) were almost equal in cost, whereas Alternative (2) was substantially more expensive. These cost comparisons were extremely sensitive to assumptions of crude oil prices and tanker rates. In an unpredictable price situation, no single alternative was clearly preferable in the long run but Alternative (3) offered small advantages.

2.6 CONCLUSIONS

- DOD is going through a dynamic period with little historical basis for predicting total fuel consumption or cost. Principal variables in this situation are: the Vietnam drawdown, Arab oil embargo, conservation program, rising petroleum prices, changing force structure, and changing market conditions.
- DOD petroleum consumption in FY74 will average about 571,000 BPD—the lowest since FY55. This consumption rate represents 3.4 percent of the U. S. total, down from 4.3 percent in FY73.
- Economic analysis indicates that in the short term the DOD should maintain a flexible energy procurement policy. Continuing instability in the national and international oil markets, together with uncertainties associated with the increasing role of international politics in those markets, preclude establishment of long-range procurement policies for petroleum at this time. In the short term, the policy of procuring overseas the fuel planned to be used overseas is the most logical approach.

- A 200 percent increase in DOD standard prices for petroleum products has pushed the annual budget for energy up to about 4.5 percent of FY75 total DOD planned outlay. Price increases for utilities are still lagging those for petroleum, and their full impact is yet to be felt.
- In spite of ability to pay market prices, DOD continues to have difficulty buying fuel. Domestically, petroleum is still being obtained under mandatory allocation, and DPA will have to be invoked for coal if existing shortfalls cannot be covered. Phaseout of mandatory allocations for petroleum may again necessitate use of DPA for these products.
- Improvements in monitoring energy consumption and projecting requirements must be continued.
- Improvements in accountability for fuel both in budgeting and inventory control must be sought. Expedited billing and payment procedures need to be implemented in view of the increasing value of fuels and to improve the posture of the Defense Fuel Stock Fund.

2.7 RECOMMENDATIONS

Recommendation 2/2-1

The Directorate for Energy should continue to develop improvements in techniques for monitoring energy consumption and projecting requirements.

Recommendation 2/2-2

DSA should continue to develop procedures to reduce reporting lag time from field activities and to decrease the response time for billing and payment for fuel.

Recommendation 2/2-3

DSA should, in the short term, procure overseas the fuel planned to be used overseas.

Recommendation 2/2-4

ASD (I&L) should seek establishment of standby procedures for mandatory petroleum allocation if enabling legislation lapses, and should also seek DPA application to coal.

Recommendation 2/2-5

The Director for Energy and ASD(C) need to maintain close liaison in developing logistics and budget data, and should develop budget formats that make visible the growing DOD energy bill.

Recommendation 2/2-6

The Services should review their methods of accounting for fuel receipts, inventory, and consumption and should make improvements where necessary.

CHAPTER 3

PETROLEUM STORAGE AND DISTRIBUTION

3.1 INTRODUCTION

Because of the ongoing changes in force strength and deployments, the historic patterns of petroleum distribution have been disrupted and possibly permanently altered. In recent years, consumption by DOD was divided about equally between CONUS and overseas. At the present time, the CONUS share of consumption represents nearly two-thirds of the DOD total; overseas consumption has been reduced significantly. Superimposed on this change was a temporary disruption in distribution patterns brought on by the Arab oil embargo. The Defense Energy Task Group report of 15 November 1973 identified a number of existing or anticipated problems in the area of petroleum storage and distribution and advanced seven recommendations (three of which are entered here as 9-2, 9-3, and 9-4; they are discussed also in Chapter 9, the classified supplement issue 1 separately).

3.2 STATUS OF DETG RECOMMENDATIONS

In this section, each of the seven original DETG recommendations regarding petroleum storage and distribution is repeated in its entirety. Following each recommendation, related events that have occurred since November are described, and the status of the recommendation is discussed.

Recommendations 3-1 and 3-2 were assigned to the Defense Supply Agency (DSA). Prior to 1 July 1973, DSA's petroleum mission primarily concerned procurement. On that date, Integrated Material Management was implemented, and DSA's petroleum function was expanded to include integrated management of bulk petroleum. DSA did not buy new facilities to meet these new obligations; rather it was operated through the Military Services when new facilities and related technical assistance were required. DSA does enter into service contract arrangements with commercial firms as a means of acquiring storage facilities and services for its operations.

3.2.1 Recommendation 3-1

The Defense Supply Agency should acquire petroleum facilities for use as central distribution points through 3- to 5-year lease agreements to meet shortfalls in heating fuel and ground operations supply. Associated budgetary and manpower impact should be quantified by DSA and submitted to the Assistant Secretary of Defense (Installations and Logistics) for approval.

This recommendation placed a requirement on DSA to store and distribute Government-owned fuels for heating and installation support. These fuels had historically been acquired by installations through local distributors on essentially a retail basis, while DSA had been concerned only with bulk/wholesale storage and distribution.

DSA has recently acquired the former Navy Melville facility at Newport, Rhode Island, which has a capacity of 1.3 million barrels. This facility is being used to support some installations that were previously served by the Navy as well as some that could no longer obtain small lots commercially. Application of mandatory allocations has obviated the need to acquire additional storage facilities; however, if mandatory allocation is phased out, this recommendation will need to be reconsidered. Accordingly, DSA is presently processing inputs from some 9,500 military and Federal civilian installations and activities in CONUS to determine the requirements for additional storage facilities for mission-essential heating and ground fuels. Following this determination, DSA will identify additional budgetary and manpower impact on the Agency. A report will be submitted to ASD(I&L) by 1 August 1974. Further, DSA has recommended that Recommendation 3-1 be restated to emphasize acquisition of Government-owned facilities and/or service contract arrangements to provide uninterrupted support of mission-essential requirements.

3.2.2 Recommendation 3-2

The Defense Supply Agency should conduct detailed joint reviews of storage requirements for FY75 to FY79 (as required by DOD Manual 4140.25 and DOD Manual 4140.25M), and report the results to the Assistant Secretary of Defense (Installations and Logistics) by 1 February 1974 with

1 April annual updates thereafter. The review of storage capabilities should encompass:

- On-base and terminal facilities
- Accuracy of reporting system
- Utilization and material condition of available assets, including programs for necessary repair and re-habilitation of tankage
- Disposition recommendations for malpositioned or underutilized tankage assets including joint utilization and/or exchange of facilities between the Department of Defense and industry.

Recommendation 3-2 provided specific target dates for the existing requirement for DSA to develop a projected worldwide bulk storage support plan. To produce the plan, DSA was required to reassess basic inventory management objectives with the Military Departments and Unified Commands. A data collection and display effort is presently underway.

Facility capability data are being updated by DSA to reflect the most recent military activity and bulk storage backup capability. DSA is matching requirements against availability of storage. Overall, sufficient storage capacity is believed to exist; however, it is expected that deficiencies exist in certain locations while others have excess capacity. A new and revised DSA Inventory Management Plan, which serves as the base for a projected FY75 through FY79 support plan, is under development. Scheduled maintenance and MILCON requirements have been identified. Following the analysis of data, DSA will develop specific recommendations to be submitted to ASD (I&L) by 1 August 1974.

3.2.3 Recommendation 3-3

The Services should prepare programs for modernizing strategic, high-usage military POL terminals (e.g., Norfolk, Rota, Sasebo, Subic Bay) to accommodate tankers up to 80,000 DWT and should review current capability and R&D programs to provide for over-the-beach discharge in view of increasing tanker size.

The status of this recommendation, for each of the Services, is detailed in the following paragraphs.

3.2.3.1 Army

The Army will not need a terminal capable of accommodating an 80,000-DWT tanker. The Army is developing methods for tanker mooring, over-the-beach discharge, and barge transfer of petroleum. These efforts are intended to serve tankers of up to 25,000 DWT. The system being developed must be air-transportable in an aircraft the size of a C-130 and must be capable of being placed in service within 72 hours. The Army system utilizes the Navy's 6-inch coupled pipeline for offloading.

3.2.3.2 Navy

The Navy Facilities Engineering Command (NAVFAC) has defined a milestone plan for the study to modernize Navy POL facilities. NAVFAC has requested that the Chief of Naval Material consider the project as a deficiency for apportionment under FY75 O&M funds in the amount of \$75,000.

An R&D effort is underway on a ship-to-shore POL support to Marine amphibious operations. An exploratory study is scheduled for completion in August 1974. It is anticipated that exploratory hardware development and testing will be initiated in early FY75.

NAVFAC is fully aware of the Army's developments for over-the-beach discharge of petroleum and is taking steps to avoid any duplication of effort. The Navy's plan is to provide for future dependence upon commercial and MSC deliveries because of the retirement of Navy oilers (AOGs). The Navy's work has included investigation of the operational feasibility and military utility of using LASH/SEABEE barges for ship-to-shore delivery. Possible use of 7,100-barrel collapsible bladders for ship-to-shore delivery is also being investigated.

3.2.3.3 Air Force

Under the provisions of DOD Manual 4140.25, Procedures for the Management of Petroleum Products, seven Air Force terminals are to be transferred on a beneficial use agreement to DSA no later than 1 July 1975. Ownership of fuel stored in these terminals and the responsibility of managing the operating contracts was transferred to DSA on 1 July 1973.

The Air Force has surveyed terminal facilities within its jurisdiction; the results indicate the feasibility of upgrading its capacities. The programming of improvements will depend upon existing agreements with other DOD activities and contract terminal operators. The requirement for modernization of the facilities must be developed and justified by DSA. Programming of modernization improvements may be necessary through service contracts.

The Air Force did not address over-the-beach discharge because it does not apply.

3.2.4 Recommendation 3-4

The ASD (I&L) should ensure that the Military-Sealift-Command-controlled tanker fleet possesses sufficient small-tanker capability to support war and/or peacetime military shallow-draft POL requirements. The current construction program for building nine handy-size tankers is strongly endorsed and should be extended.

ASD (I&L) has proposed that the Weapons Systems Evaluation Group (WSEG) conduct a study of the nature of and the need for changes in POL transport systems in the 1978 to 1983 time frame. Part of the problem to be examined is the need for small handy-size tankers versus both the improvement of terminals for larger tankers during peacetime and wartime and the utility of prepositioned war reserves. The study is targeted for completion on 1 July 1975.

3.2.5 Recommendation 9-2

The ASD (I&L) should conduct a joint review, with participation by DDPA&E, JCS, military departments, DSA, and MSC to establish uniformity among the Services on:

- Selection of fuels to be prestocked
- Number of days of combat support for prestockage requirements, based on JCS recommendations.

The intent of this recommendation has largely been carried out on a day-to-day basis by the Directorate for Energy in developing three quarterly requests under the Mandatory Allocation Program and through actions completed under Recommendations 3-2, 9-3, and 9-4. Issuance of JSOP 77-84, Volume I, May 1974, requires revalidation of the foregoing. Chapter 9 treats of additional actions needed under this recommendation.

3.2.6 Recommendation 9-3

The JCS should recommend to the ASD (I&L) a mandatory minimum level for PWRS for all fuels.

On 31 January 1974 the JCS conducted a review of bulk petroleum Prepositioned War Reserve Requirements (PWRR) and developed suggested planning factors for determining them; that is, shortfalls of capacity versus PWRR.

The JCS has recommended that minimum PWRS levels not be established, since it is considered that the Services' PWRR developed from the planning factors constitute the maximum acceptable logistics risk.

3.2.7 Recommendation 9-4

The JCS should rescind policy guidance of reliance on commercial assets in foreign countries as applying against in-theater PWRS.

This recommendation has been completed. Discussion is provided in the classified annex to this report.

3.3 RECENT DEVELOPMENTS

3.3.1 Impact of Arab Oil Embargo

The Arab oil embargo in the fall of 1973 caused a disruption of DOD fuel distribution patterns. During the most severe period of the embargo, DOD was buying less than 100,000 BPD overseas compared to almost 300,000 BPD before the embargo. The shift of emphasis to CONUS as the principal source of petroleum products required changes in tanker routes and repositioning of tankers, with consequent delays in deliveries to overseas installations. The situation was exacerbated by refusal of some foreign countries to sell petroleum products to U.S. forces stationed in those countries or to allow storage of petroleum for U.S. forces in foreign-owned tanks. This experience emphasized a need for DOD to reexamine its petroleum storage and distribution policies, particularly the adequacy of existing storage facilities to cope with peacetime supply interruptions while maintaining a sufficient war reserve.

3.3.2 New Technologies for Fuel Storage

In recent years several European countries have created underground geostorage facilities. They appear to be much more secure and cost effective than the standard tanks generally used to store petroleum products in the United States. Abandoned mines are presently in use in France. In the last 3 years, West Germany has constructed 1.3 million barrels of storage by leaching out salt domes. The Russians are presently using, "on a prototype industrial basis," a 100,000-barrel facility that was created by the underground detonation of a small nuclear device. These new technologies of geostorage will undoubtedly see increasing use in the future and their applicability to the storage problems of DOD should be investigated.

For use at port sites, submersible concrete storage tanks could provide a solution to the problem of over-the-beach discharge. These tanks, with capacity up to the million-barrel variety, are towed into place and then sunk by ballasting. They could handle the entire cargo from a large tanker, after which the products could be drawn off as needed. As with geostorage, this technology is relatively recent, and its use has yet to be investigated by DOD.

3.4 CONCLUSIONS

- The possibility that mandatory allocations may be suspended makes it necessary for DSA to continue its survey of storage facilities for mission-essential heating and ground fuel requirements.
- The detailed joint review of storage requirements undertaken by DSA is now scheduled for completion by 1 August 1974.
- Separate recommendations on terminals and handy-size tankers made in the DETG report need to be considered together and in relation to PWRS. Army and Navy programs for discharge at undeveloped ports are underway.
- Peacetime cutoff of supplies during the Arab oil embargo should stimulate thinking on the need for increased operating stocks and alternate methods of storage and distribution.

3.5 RECOMMENDATIONS

Recommendation 2/3-1

DSA should continue planning for the acquisition of Government-owned facilities and/or service contract arrangements, to provide uninterrupted support of mission-essential heating and ground fuel operational requirements in the event that mandatory allocations are suspended. Associated budgetary and manpower impact should be identified.

Recommendation 2/3-2

- a. DSA should prepare programs (in accordance with DOD Instruction 4140.25) for modernizing strategic, high-usage military POL terminals (e.g., Norfolk, Rota, Sasebo, Subic Bay) to accommodate tankers up to 80,000 DWT. These programs should be submitted

through ASD (I&L) to the Military Departments for the development of MILCON projects.

- b. The Navy should submit a consolidated progress report to the ASD (I&L) on current R&D programs being conducted by both the Army and Navy aimed at providing over-the-beach discharge capability.

Recommendation 2/3-3

ASD (I&L) should ensure through WSEG's studies that an appropriate tradeoff is developed among the needs for handy-size tankers, improved terminals for larger tankers, and prepositioned war reserves.

CHAPTER 4

FLEXIBILITY IN FUEL SELECTION

4.1 INTRODUCTION

The recommendations of the DETG report were intended to increase the availability of fuel to the Department of Defense. The report recommended that DOD:

- Modify Federal and military fuel specifications where these were unnecessarily restrictive
- Modify existing equipment to permit the use of alternative fuels, especially commercial-type fuels
- Ensure that future equipment has the capability to use alternate fuels.

In framing its recommendations, the DETG report assumed that commercial-type fuels would be the most widely available. This assumption has not proven to be the case. For example, during the Arab oil embargo kerosene-based commercial jet fuel was in shorter supply than the naphtha-based JP-4 used by the Air Force. This situation occurred because a larger fraction of a barrel can be converted to JP-4 than to commercial jet fuel (Figure 4-1). This shortage of commercial fuels indicates that the key to fuel availability in a time of changing relative shortages is flexibility to use alternative fuels, rather than standardization on a single widely available fuel. If DOD could have responded to changing supply conditions by procuring alternative and more available fuel types, then the Department might have been able to avoid some of the curtailment of operations it experienced this last half year. If DOD has the ability to procure alternative fuels, it might also reduce its fuel costs. Where availability is not a factor, DSFC would be able to procure alternative fuels on the basis of price with much more latitude than it presently has.

The ability to procure the most available fuels requires equipment with a multifuel capability. Current activity directed toward fuel standardization shows that the fuel requirements of some

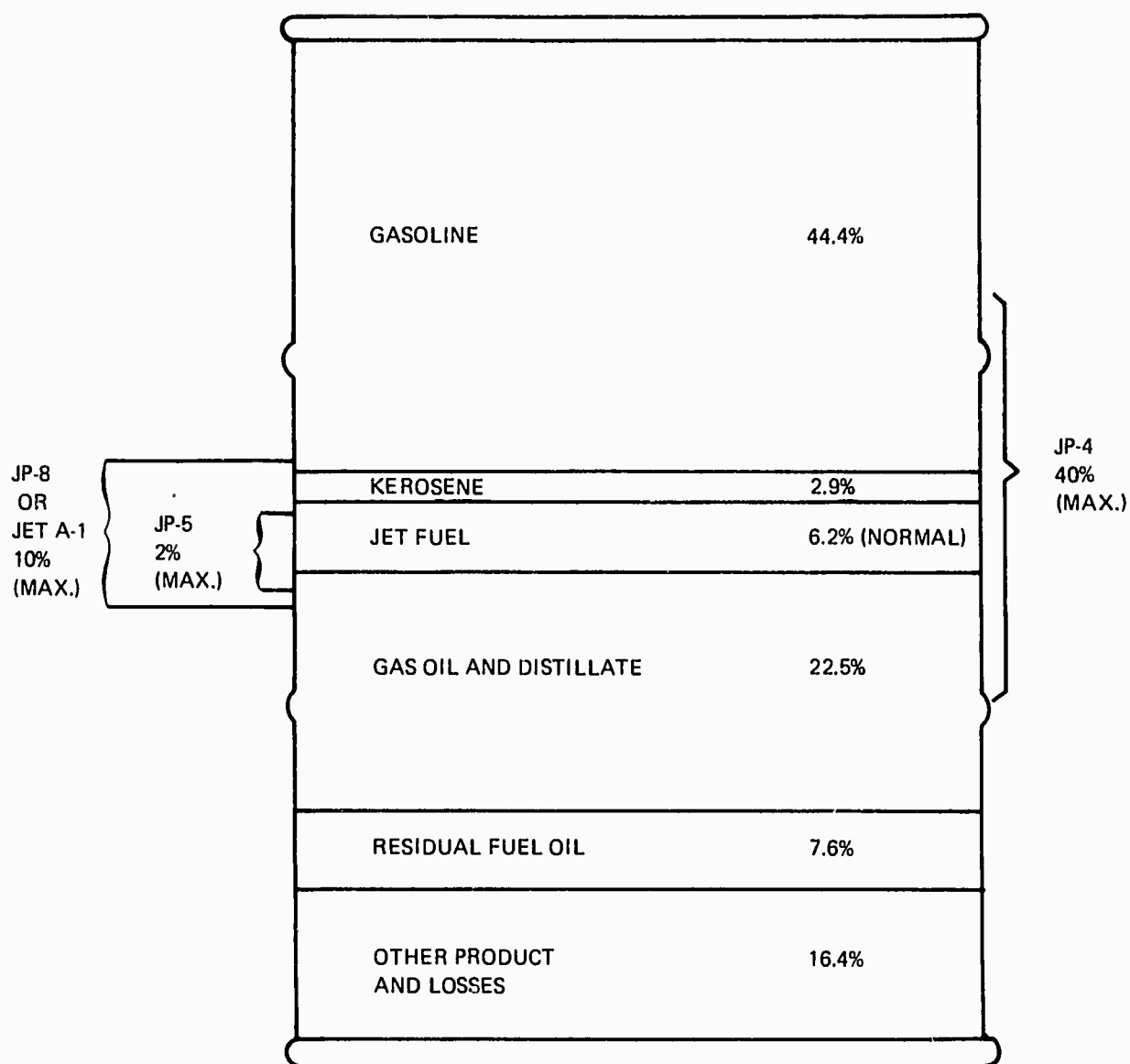


FIGURE 4-1. PERCENT YIELD FROM A BARREL OF CRUDE OIL

equipment now in the inventory are not sufficiently flexible, nor have recent development projects included test programs using alternate fuels. As a result, DOD is generally constrained to procure the primary fuel type for each equipment, regardless of the cost or availability of that particular type. In a period of fuel shortages, such inflexibility adds to logistics problems and fuel costs. The DOD objective should be to provide a multifuel capability in the present inventory, as practicable, and to include that capability in equipment being developed.

4.2 STATUS OF DETG RECOMMENDATIONS

Just prior to publication of the DETG report, a DOD Ad Hoc Fuel Standardization Working Group issued a report urging many of the same standardization moves recommended by DETG. Importantly, it included a recommended DOD fuels logistics policy that emphasized the incorporation of a multifuel capability into future DOD equipment. That draft policy set the direction for an official policy statement that is under preparation.

In response to the two reports and to growing fuel shortages, the Joint Logistics Commanders (JLC) established a Joint Technical Coordinating Group (JTTCG) in late November 1973. This group has been the focal point of responses to the DETG recommendations.

In summary, the status of the nine DETG standardization recommendations is as follows:

- One was overtaken by events since the report and should be revised
- Three need further attention
- Five have been completed.

In the remainder of this section each recommendation is presented verbatim and its status is briefly described.

4.2.1 Recommendation 4-1

In view of current petroleum product shortages, the Defense Standardization Board should pursue the standardization of fuels within the Department of Defense with a sense of urgency in order to ensure maximum practicable compatibility with the most readily available sources of supply of satisfactory fuels.

Events since the DETG report have shown that "the most readily available source of supply" cannot be predicted. Efforts to standardize, without flexibility, may increase DOD's vulnerability to fuel shortages. This fact is being recognized in a DOD fuel logistics policy paper being drafted for presentation to the Joint Logistics Commanders early in FY75. Drafts of the policy have increasingly focused on the provision of a multifuel capability in new equipment being developed. The final policy is expected to specify the fuels and their alternates that various types of equipment shall be capable of using.

4.2.2 Recommendation 4-2

The Director of Defense Research and Engineering should ensure that the capability to use standard and commercially available fuels as well as multiple fuels is incorporated into weapons and support systems designs where possible.

DDR&E has not yet incorporated a multifuel capability as a requirement for new weapons systems.

4.2.3 Recommendation 4-3

The Defense Standardization Board should actively pursue a program that has the ultimate objective of specifying a single petroleum fuel for each of the major mobility systems, that is, aircraft, ship, and ground operations.

According to the JTCG, "full" implementation is neither feasible nor desirable. However, marine standardization will be complete with the Navy's conversion from NSFO to ND fuel by September of this year. The Navy has further decided to standardize on DFM as the single multipurpose petroleum fuel for ship propulsion commencing

with the FY75 procurement cycle. Importantly, the fleet will retain the capability to burn either NSFO, ND, or DFM.* Other mobility systems are covered under Recommendations 4-5 through 4-8.

4.2.4 Recommendation 4-4

The Defense Supply Agency should review existing and newly developed military POL specifications and testing requirements for compatibility with commercial standards. Where the variations are insignificant, the commercial standard should be adopted (with specified exceptions or supplements if necessary) so as to reduce the need for special military and Federal specifications and redundant testing.

Under pressure from suppliers, the Military Services have begun testing programs to see if certain specification properties might be relaxed. Waivers have been issued when appropriate for the purchase of off-specification fuel when it was determined that equipment performance would not be compromised. In most cases, the off-specification bulk products have been blended with a sufficient percentage of specification material to bring the total quality up to minimum specification level.

The relatively stringent features of Federal/military specifications have in some instances hindered DOD in its procurement of fuels and/or have led to higher prices than the civilian sector pays for similar fuels. In most cases, the Federal/military specification fuel variations are intended to provide a return in terms of decreased equipment maintenance costs or better performance. Cost-benefit analyses have not been routinely made, however, and the Services have not been informed as to the cost implications of their fuel requirements that are in excess of commercial specifications. These costs should be quantified now that the price of fuel has more than doubled.

In order to assess the cost impact of differences between military and commercial fuel specifications, the true production costs associated with these differences must be determined. Market prices do not reflect the true cost differentials adequately since suppliers may

*DFM is fully compatible with ND fuels, and is more attractive for use with diesel engines and gas turbines.

choose to absorb these costs in times of surplus and overstate them in times of shortage. An analytical study to define the basic differences in production costs is essential so that any added costs for procuring to military specifications may be minimized.

4.2.5 Recommendation 4-5

The Defense Standardization Board should explore the feasibility of using NATO F-54 diesel fuel for ship propulsion as well as shore use.

The United States sought to have the flash point of F-54 raised from 136° to 140°F at the NATO fuels and lubricants meeting in June 1974 on the basis that, when upgraded, F-54 could be suitable for marine use as an alternate fuel. However, the NATO Army Working Party was unwilling to incur the higher cost and reduced availability of the higher flash point fuel. It is to be noted that DFM (NATO F-76), which the Navy has recently adopted as a single multipurpose fuel, is the preferred NATO primary ship fuel.

4.2.6 Recommendation 4-6

The Air Force should strongly consider phasing in the use of JP-8 as a standard fuel as supply conditions permit, and the Navy should investigate the feasibility of similar action. The ASTM specification for Jet A-1 should be used for this fuel but modified to include anti-icing agent and a corrosion inhibitor.

This recommendation had several parts:

- The Air Force is considering the use of JP-8. Any decision will be governed by present and advanced equipment requirements and the economics and availability of JP-8.
- JP-8 is not currently available in quantities sufficient to satisfy DOD requirements because of a lack of refinery capacity for middle distillates. A Department of Interior memorandum dated 2 November 1973 urged a delay of nominally 3 years in any Air Force switch from JP-4 to JP-8. Figure 4-1 shows why JP-4 is more likely to be

available than JP-8, even in the future. A large number of crude oil fractions can be used to make JP-4; only 10 percent of a barrel of crude oil can be refined into JP-8.

- The Navy will not use JP-8 aboard ship because of its low flash point—105°F compared to 140°F for JP-5. Safety is the main factor, cost another. The cost of converting active ships to store and handle JP-8 safely is estimated at more than \$845 million.

4.2.7 Recommendation 4-7

The Defense Standardization Board should study standardization on commercially available Avgas 100/130 for use in reciprocating engine aircraft, considering the programmed phaseout of aircraft requiring Avgas 115/145.

The JLC standardization group has prepared a report outlining necessary actions for phasing out aircraft requiring Avgas 115/145.* The report has been forwarded to Joint Service Commanders for agreement and implementation. The availability of Avgas 115/145 continues to decline. NATO countries report that it will not be obtainable on the Continent after 1974. In the United States, the switch from leaded to unleaded automotive gasoline will aggravate the shortage of Avgas 115/145, since the same alkylates are required for both fuels.

4.2.8 Recommendation 4-8

The Defense Standardization Board should pursue worldwide standardization on 91 RON (NATO F-46) motor gasoline, and procurement contracts for higher octane gasolines should be awarded only with approved waivers by the Defense Standardization Board.

Tests to determine the across-the-board acceptability of 91 RON gasoline are still underway and scheduled for completion in late 1974. In December 1973, the Services authorized the use of 91 RON gasoline for administrative and certain tactical vehicles in Europe.

*The numbers 100/130 and 115/145 are equivalent octane numbers (true octane numbers do not exceed 100) and represent performance ratings for lean/rich mixtures.

4.2.9 Recommendation 4-9

The Defense Fuel Supply Center should take the lead in standardizing on commercial fuels to be used by military installations.

Virtually all fuels used by military installations are now products readily obtainable from the commercial market. Procurement specifications for installation fuels do not appear to be restricting availability.

4.3 CONCLUSIONS

- While the Services, especially the Navy, are pursuing fuel standardization where practicable, multifuel capability should be their larger objective. Long-term success in increasing the availability of fuel will depend upon the capability of equipment presently being developed to accept a wide variety of fuels.
- Multifuel capability is not generally being provided in the development of new equipment.
- DSA is seeking to reduce the barrier to fuel availability posed by Federal/military fuel specifications. The Services have not generally been informed of the cost implications of fuel specifications that are more stringent than commercial specifications.
- DOD is incurring premium costs by using Avgas 115/145 instead of 100/130. As the commercial availability of Avgas 115/145 declines, the cost to DOD of long-distance transportation and special refinery runs will make the fuel disproportionately expensive. Present policy justifies these costs by citing the need to retain certain aircraft in the inventory. The need for the aircraft has not been reexamined in the light of the unusual fuel costs incurred by their retention. (The problems of fuel cost and availability affect all military users of Avgas, not just the units operating these aircraft.) The affected aircraft are shown in Table 4-1. Many of them are assigned to National Guard units and are nearing retirement. Many of them already pose support problems in terms of spare parts.

TABLE 4-1
AIRCRAFT THAT MUST USE AVGAS 115/145

<u>AIRCRAFT</u>	<u>R-ENGINE</u>	<u>INVENTORY</u>	
		<u>NAVY</u>	<u>AIR FORCE</u>
C-97	4360	—	76
C-119	3350	77	24
C-121	3350	13	37
C-124	4360	—	26
*C-1A	1820	68	—
*S-2D/E/G	1820	319	—
*E-1B	1820		
	Total	477	163

*CARRIER BASED, will require flight testing to determine if use of 100/130 is possible.

4.4 RECOMMENDATIONS

Recommendation 2/4-1

The Directorate for Energy should continue to participate in the drafting of a DOD fuels logistics policy that will require the provision of a multifuel capability in new equipment being procured and developed by DOD.

Recommendation 2/4-2

Following publication of a DOD fuels logistics policy, the Director of Defense Research and Engineering should advise ASD (I&L) which equipment currently under development will have a multifuel capability (as defined by the policy) and which will not.

Recommendation 2/4-3

The Joint Logistics Commanders should determine which piston aircraft in the inventory can be converted to use Avgas 100/130 in a cost- and mission-effective manner during the remaining projected service life of the aircraft. The JLC should develop conversion schedules for those aircraft.

Recommendation 2/4-4

The Joint Logistics Commanders should recommend to their respective Services an accelerated phaseout plan for those aircraft within the inventory that cannot be converted to 100/130 Avgas. This phaseout should be as early as practicable in conformance with operational requirements in order to lessen potentially serious mission-support problems.

Recommendation 2/4-5

DSA should analyze the additional cost of those Federal/ military fuel specifications or testing procedures that are more restrictive than commercial specifications and so advise the Services. The Services should reexamine their requirement for the additional fuel features in light of the cost data provided by DSA.

CHAPTER 5

NAVAL PETROLEUM AND OIL SHALE RESERVES

5.1 INTRODUCTION

The DETG report of 15 November 1973 focused on the Naval Petroleum Reserves rather than on the Naval Oil Shale Reserves. Emphasis on petroleum rather than on oil shale was appropriate considering the immediacy of the oil shortages and the lack of a developed shale oil industry. Since November, the rising price of crude oil has led to a renewed interest in shale oil extraction and in the Naval Oil Shale Reserves (NOSRs). This chapter begins by tracing action on the recommendations of the DETG report and concludes with a discussion of oil shale developments as they affect the Naval Oil Shale Reserves.

The DETG report recommended that the Naval Petroleum Reserves (NPRs) should be explored and developed so that their productive capacity would be quickly available should a military need arise. Since November, the essence of these recommendations has been implemented. As a result of initiatives from several quarters—Congress, the Office of Naval Petroleum and Oil Shale Reserves, and other parties—\$59 million has been appropriated for the exploration and development of the Reserves. Exploration has been underway for several months and has already located additional reserves within an extension of the field at Elk Hills, California, NPR #1.

Production of the Reserves has also been sought. During the last 8 months, the Administration and several members of Congress have attempted to secure Congressional approval authorizing the production of oil from Elk Hills. The production of oil from the Reserves on a large scale in peacetime would constitute a change of policy. As recently stated by the Assistant Secretary of Defense (Installations & Logistics), DOD policy regarding the Reserves as developed by the DETG is that:

- Jurisdiction over the NPRs should remain in the Department of the Navy

- Exploration and development of their full productive capacity is important to the national security of the United States
- A determination should be made by Congress after exploration is completed as to the development and production of any oil and gas reserves in the Reserves that are in excess of defense requirements, as determined by the Department of Defense.

5.2 STATUS OF DETG RECOMMENDATIONS

5.2.1 Recommendation 5-1

The Secretary of the Navy, with support from the Secretary of Defense, should more fully develop the scope and depth of analysis required to support the "Engineering Plan for the Assessment and Evaluation of the Naval Petroleum and Oil Shale Reserves," dated March 1973.

The engineering plan is being updated and revised in light of increased costs and additional information developed since the time it was prepared. The revised costs for NPR #1 and NPR #4 have been compiled and included in the POM 76 request of the Office of Naval Petroleum and Oil Shale Reserves.

5.2.2 Recommendation 5-2

The Secretary of the Navy, with support from the Secretary of Defense, should pursue the funding and staffing for the administration of an accelerated program of contractual exploration and subsequent full development of potential reserves of the Naval Petroleum Reserves through normal budget processes.

As a result of initiatives by Senator Henry Jackson, a supplemental appropriation bill was passed by Congress authorizing \$59 million for exploration and development of the two most promising Naval Petroleum Reserves, NPR #1 in California, and NPR #4 in Alaska. An additional \$13 million was appropriated for operations to produce Elk Hills at a rate of 160,000 BPD for 1 year, but the release

of these funds is contingent upon passage of a joint resolution authorizing increased production. The \$59 million is being spent as follows:

- \$11.5 million for exploration of NPRs #1 and #4
- \$47.5 million for further development of NPR #1.

Using these funds, four rigs are currently in place drilling new wells at NPR #1. Additional reserves estimated at more than 100 million barrels have been discovered. Exploration of NPR #4 is underway, with 1,200 line miles of seismographic survey to be completed this year.

While supporting exploration and development, Congress has not yet authorized the production of the Reserves. On 7 November 1973, the President endorsed a recommendation by the Secretary of the Navy to produce Elk Hills for 1 year. The Senate bill (Senate Joint Resolution 176) passed on 19 December by a margin of 87 to 10. The House bill (House Joint Resolution 832) was introduced on 27 November and was referred to the House Armed Services Committee. Between 29 November and 30 January 1974, seven additional bills were introduced in the House, all similar to House Joint Resolution 832. These bills were also referred to the House Armed Services Committee.

The House bill proposed that revenues from the sale of oil from the Reserves be credited against a special fund, which could then be used to defray the costs of further exploration and development of the Reserves. Congressional control would be retained inasmuch as monies in the fund could only be released through Congressional appropriation. Under current practice, revenues from the Reserves are credited against the General Receipts of the Treasury. The amount of these revenues is small compared to the cost of exploring and developing the Reserves. Revenues in calendar year 1973 were \$4.28 million.

5.2.3 Recommendation 5-3

If necessary funding and staffing to support full contractual exploration and development of the Reserves cannot be obtained through the normal budget processes, the Secretary of the Navy should pursue the development of a procurement strategy that will permit industry participation in the exploration, development, and production of the Reserves. The development of such a methodology would require:

- The approval by the Congress of legislation, or the establishment of Congressional intent through hearings on such legislation, which would commit the Congress, upon completion of full exploration of the Naval Petroleum Reserves, to authorize the development and production of any oil and gas reserves developed in the Reserves that are in excess of defense requirements, as defined by the Department of Defense. Any such production would necessarily provide for a fair rate of return to be agreed on by the Government and the participating contractors.
- The definition of the procedural aspects of such a method should, as a minimum, provide for:
 - Definition of the scope of the program of exploration required by the Government.
 - Requests for submission by interested firms or consortiums of statements of interest in and proposed technical approaches to the program proposed by the Government. Evaluation of the feasibility and limitations of the program proposed by the Government should be solicited.
 - Establishment of a board of qualified DOD technical, legal, and contractual personnel to review proposals, develop a definitive contractual package, and select those firms or consortiums to whom a request for a detailed technical proposal should be directed.

- Review by the evaluation board of all proposals to determine those that are technically and economically responsive, and development of a recommendation for award or negotiations leading to an award.
- Provisions for collection and analysis of exploration data developed by the contractors at their own expense.
- Submission of the foregoing data by the Secretary of the Navy to the Congress for its authorization for further development, production, and conservation as defined in earlier Congressional authorization.

Action on this recommendation is awaiting the outcome of attempts to obtain funding through the normal budget process.

5.2.4 Recommendation 5-4

The Secretary of Defense should request the Secretary of the Navy to conduct an analysis of the Naval Oil Shale Reserves similar to the one accomplished by the Defense Energy Task Group for the Navy Petroleum Reserves.

The final report of this analysis has been completed, and is expected to be released early in FY75.

5.3 OIL SHALE DEVELOPMENTS SINCE THE DETG REPORT

The DETG report concentrated on the Naval Petroleum Reserves. Since then, petroleum shortages and high petroleum prices have renewed commercial interest in oil shale. Because commercial shale oil projects will increase the importance of the NOSRs, recent developments toward a shale oil industry are traced below.

5.3.1 Commercial Support of Oil Shale Development

The commercial development of a shale oil industry appears likely, although not until about 1985. Large amounts of money have already

been committed to the construction of shale oil plants even though the plants will not be in production until the 1980's. The most advanced project underway is a proposal by the Colony Development Corporation to build a 50,000-BPD shale oil plant, together with its associated mining, ore transport, and waste disposal facilities. The project is estimated to cost \$400 million. Even if the project proceeds on schedule, production will not begin until the early 1980's. Presently, the project is behind schedule. Colony has applied to the Department of the Interior (DOI) for a permit to build a product pipeline across Government land. DOI has not yet acted on the application.

Other projects will follow from the prototype oil shale leasing program that DOI is currently undertaking. However, technical proposals under the program are not due until mid-1974, and production is not foreseen until the mid to late 1980's.

5.3.2 Government Support of Oil Shale Development

The Federal Government has been encouraging the development of a shale oil industry, although Federal funding has not been available either directly or on a large scale. Current programs are as follows:

- Through its prototype oil shale leasing program, DOI has made Federal lands available for shale oil projects. Leases for six tracts of land—two each in Colorado, Wyoming, and Utah—have been put up for bid this spring; the first lease sold for \$210 million. The terms of the leases are such that the land will be used for shale oil production rather than being held as a speculative investment. The leasing of Federal lands encourages the development of a shale oil industry because the most easily consolidated parcels of land belong to the Federal Government. Federal land is not essential, however. The Colony project uses shale from private lands.
- The Department of the Navy is supplying 400,000 tons of shale from NOSR #1 for use in the Anvil Points facility located on NOSR #3. Anvil Points is a research and demonstration facility authorized by the Synthetic Fuels Act of 1944. The Bureau of Mines conducted shale oil

research at the facility for many years. In 1973, DOI leased Anvil Points to Development Engineering, Inc., for its use in building a small-scale demonstration plant on the property. Congressional approval was obtained for the mining of 400,000 tons of oil shale over the life of the project.

- The Bureau of Mines continues to do a small amount of research in oil shale technology at its Laramie, Wyoming, research facility.
- The Federal Energy Administration's Project Independence includes oil shale development as an alternate energy source.

5.3.3 Obstacles to Oil Shale Development

The obstacles to oil shale development are mainly economic and environmental. The current interest in shale stems from the high price of oil rather than from any technological breakthrough. Technical innovations are occurring, especially regarding the move from small- to large-scale plants. However, these innovations are not expected to alter the economic picture in a major way. To succeed, the current oil shale projects require that oil prices remain at high levels.

After economics, environmental factors are the major barrier to oil shale development. Strip mining and spent shale tailings constitute an environmental disturbance no matter how ameliorated. The environmental impact of large-scale oil shale operations is not well known. Recent expansion of coal strip mining in Wyoming and Colorado has heightened public awareness of the environmental hazards posed by new extractive industries.

5.3.4 Oil Shale Technology

The basic technology used in shale oil production is not new. The ore is first mined, using conventional room and pillar or strip mining techniques. The ore is then transported to a retort by truck or conveyor. In the retort, the shale is heated in the absence of air, a process which separates the oil from the shale. Most of the current oil shale development work is aimed at increasing the efficiency of

the retorting process using various types of retorts. The spent shale is dumped in a pit or ravine and watered. This step consumes large amounts of water, but transforms the tailings from rubble or dust to a hard rock. The shale oil, while not identical to crude petroleum, can be refined using the same technology.

An in situ process has recently been demonstrated, although not on a commercial scale. In the in situ process, a cavern is excavated in the shale, and explosives are ignited in the shale above the cavern. An underground hollow of crushed shale is thus formed. Air and natural gas are pumped into the crushed shale and ignited. The shale thus becomes its own retort, and oil drains to the bottom of the hollow, where it is recovered by pump. The advantages of the in situ process are that it requires no water, only 20 percent of the ore which is used is actually excavated, and the process presents a relatively minor waste disposal problem. The process is largely undeveloped, however, and does not present a clear commercial or environmental advantage. DOI's first Wyoming oil shale tract contains relatively low-grade shale and was therefore thought to be especially suited to the in situ process. However, no bids were received to lease the tract, which suggests that the in situ process has not yet received large-scale commercial support.

5.4 DOD ROLE IN FUTURE OIL SHALE DEVELOPMENT

5.4.1 Role of the Naval Oil Shale Reserves

Only a small role is foreseen for the NOSRs in the development of a shale oil industry. The development of a domestic shale oil industry is proceeding largely without reference to the NOSRs. Other shale lands have been available, and they have not required the Congressional action that use of the Naval Reserves would. The only current interest in the NOSRs comes from Development Engineering, Inc. That organization has proposed to expand its activities at the Anvil Points facility to include a 10,000-ton-per-day demonstration plant. The purpose of the project is to demonstrate the scale-up possibilities of the present process. At the end of the project, the Navy would have title to the plant and rights to use the process. As with the current Anvil Points agreement, the lessor would be prohibited from selling the products of the demonstration plant. Action on the proposal requires Navy approval and consultation with Congress. A decision could be expected by August 1974.

5.4.2 DOD Funding

DOD funding of oil shale technology in the near term should be modest, on the basis that it is more properly the role of other Federal agencies and industry to fund directly for the necessary research and development. This policy assumes that future oil shale extraction technologies will be applicable to the Naval Oil Shale Reserves. If, after oil shale technologies are refined, it should appear the NOSRs present unique extraction problems, then DOD should support research and development addressed to those problems.

5.4.3 Navy Studies of the NOSRs

The Navy is planning several preliminary studies of the NOSRs, contingent upon funding. The NOSRs merit further study on several grounds. The oil shale is high quality and enough land was placed within the Reserves to accommodate the retorting and waste disposal activities ancillary to shale oil production. Because of the size of the Reserves and the date of their establishment, the Navy appears to have a strong claim to water rights in the area. (Those rights are currently being litigated.) As a commercial shale oil industry develops, the NOSRs could become an important part of DOD's strategic reserves. The Office of Naval Petroleum and Oil Shale Reserves has proposed to prepare:

- An environmental baseline study to form the basis of an environmental impact statement should further development of the Oil Shale Reserves be undertaken
- Preliminary seismographic studies to locate water and natural gas resources within the Reserves
- A master plan for the development of the Oil Shale Reserves.

Implementation of these proposals is contingent upon approval of the necessary funding.

5.5 CONCLUSIONS

- A 5-year funding plan starting in FY76 to continue to explore and develop NPR #1 and a 10-year program to continue to explore NPR #4 will require substantial new funding: \$500 million for NPR #1 and \$525 million for NPR #4 (FY75 dollars).
- Revenues from the Naval Petroleum Reserves, placed in a dedicated account, are an appropriate source of funds to defray the cost of exploring and developing the Reserves. Congressional control of these funds could be retained by requiring a Congressional appropriation prior to their expenditure, as proposed in House Joint Resolution 832.
- The commercial development of a shale oil industry is underway, although not on a large scale.
- Oil shale cannot supply a significant part of DOD's fuel needs until the late 1980's at the earliest.
- After the development of a commercial shale oil industry, and after its application to the NOSRs, the Reserves will constitute a major addition to DOD's strategic reserves.
- Further studies of the NOSRs are warranted by the emerging importance of the Reserves as a national defense asset and by the Government's need to identify those extraction technologies that are best suited to the Reserves.

5.6 RECOMMENDATIONS

Recommendation 2/5-1

The Secretary of the Navy, with support from the Secretary of Defense, should continue to seek legislation that would earmark revenues from the Naval Petroleum Reserves for further exploration and development of the Reserves, subject to Congressional approval.

Recommendation 2/5-2

The Secretary of Defense should support the request of the Secretary of the Navy for funding a 5-year exploration and development program at NPR #1 and for a 10-year exploration program at NPR #4.

Recommendation 2/5-3

The Secretary of the Navy should pursue those actions cited in Recommendation 5-3 of the DETG report (that is, develop a procurement strategy permitting industry participation), if the necessary funding and staffing to support full contractual exploration and development of the Reserves cannot be obtained through the normal budget process.

Recommendation 2/5-4

The Secretary of the Navy should keep abreast of technical developments in shale oil extraction and should continue to ensure that the option of applying these technologies to the Naval Oil Shale Reserves is not foreclosed.

Recommendation 2/5-5

The Secretary of Defense should support the request of the Secretary of the Navy for funds to study the Naval Oil Shale Reserves.

CHAPTER 6 DEFENSE ENERGY CONSERVATION

6.1 INTRODUCTION

This chapter reviews the progress of DOD energy conservation efforts since the publication of the DETG report. The review encompasses the following subjects, which correspond to major sections of this chapter:

- Quantitative measures of conservation performance
- Implementation status of individual recommendations contained in the DETG report
- Conclusions regarding energy conservation progress
- Recommendations for future action.

6.2 CONSERVATION PERFORMANCE

The Director for Energy monitors energy conservation performance through quarterly reports submitted by each Service and by major DOD agencies. The reports provide data on actual consumption measured against a baseline developed from FY73 energy use. The baseline data were adjusted to exclude fuel and energy sales to other agencies and the purchase of fuels by credit card, bunkering, and into-plane contracts. However, for FY75, only sales to other than DOD agencies are being excluded to provide a more complete record of consumption. Reported figures have been stratified by type of fuel or energy consumed in the two major consumption sectors — CONUS installations and mobile operations worldwide. The Director for Energy plans to shift to the Defense Energy Information System (DEIS) for monitoring conservation performance during FY75 on a worldwide basis, which requires a restratification of baseline data to correspond to DEIS format. At the same time, previously used Performance Vector Reports (DD-I&L-1284) will be discontinued.

At the end of the third quarter, the cumulative reduction in energy use compared with the comparable FY73 period was 28 percent. Overall reductions in energy use went from 23 percent in the first quarter to 31 percent in the third. This outstanding performance exceeds the goal of the Presidential directive to reduce energy consumption by a minimum of 7 percent throughout the Government during FY74. It also surpasses the current DOD objective of achieving a reduction of 15 percent. Greater reductions have been accomplished in the mobile operations sector than in the operation and maintenance of installations. Cutbacks in the use of aviation fuels lead total energy savings in the former, while reduced use of heating oil accounted for the greatest increment of savings in the latter.

6.2.1 Qualifications of Performance Data

The performance data show substantial decreases in fuel and energy consumption in FY74 compared with the FY73 baseline. Ideally, these results should be qualified in order to isolate the increment of energy savings that can be attributed to active conservation efforts, as opposed to reductions stemming from changes in organization, operational missions, or market conditions. Data currently available do not permit a quantitative approach to this problem. Nevertheless, the following factors contributed to reductions in fuel and energy use in FY74:

- Phase-down of operations in Southeast Asia in FY73
- A modest decrease in the number of active installations and the partial closing of some facilities
- Supply problems including inadequate contract coverage and the embargo
- Temporary suspension of flying activity in National Guard and Reserve
- Budgetary constraints
- The unusually warm 1973 - 1974 winter.

6.3 STATUS OF DETG RECOMMENDATIONS

The DETG report made 20 recommendations concerning energy conservation. This section summarizes the reported implementation status of each recommendation and identifies what remains to be accomplished.

6.3.1 Recommendations Addressed to ASD (I&L)

The first seven recommendations regarding energy conservation were addressed to the Assistant Secretary of Defense (Installations and Logistics). A statement of each recommendation below is followed by a summary of actions taken, significant problems encountered (if appropriate), and a statement of what needs to be done to achieve full implementation.

Recommendation 6-1.1

Establish an office to manage its energy conservation program. This effort should include, among other specific actions, sponsoring a DOD-wide public affairs and education program. The logo and slogan (Save Defense Energy) developed by the Defense Energy Task Group should be adopted and distributed widely in the Department of Defense.

The ASD (I&L) established the Directorate for Energy on 15 November 1973.. The Directorate includes an Assistant for Energy Conservation, who manages the DOD Conservation Program. The Directorate has helped to develop information and education programs throughout DOD and monitored their progress. The logo has been distributed to Service distribution centers and has appeared in a wide variety of military media. This recommendation has been fully implemented, but it is proving more difficult to maintain a high level of interest in the conservation program as crisis symptoms subside.

Recommendation 6-1.2

Establish with the Services a utilities energy conservation package similar to the existing air and water pollution abatement program packages.

On 6 December 1973 the Services were requested to survey all existing facilities to determine upgrading requirements in view of the need for energy conservation. The results are intended to help define the scope and funding requirements of a phased program to accomplish upgrading. The three Services delivered reports to Deputy Assistant Secretary of Defense (DASD) Installations and Housing (I&H) in the first week of May, and a review of the data should be completed in July 1974.

Survey data were compiled on a total installation basis; thus, the number of retrofit projects contemplated is unknown at this time. In dollar terms, preliminary analysis indicates that Army, Navy, and Air Force requirements will amount to approximately \$385 million, \$398 million, and \$346 million, respectively. It should be noted that these totals probably understate the ultimate costs because of inflation and because the survey effort concentrated on the identification of major, readily apparent requirements. In any event, the total projected costs are on the order of \$1 billion.

Preliminary estimates in energy savings through retrofit are unavailable at this time.

In addition to a comprehensive survey of energy conservation needs, the Services have also highlighted large, relatively rapid pay-off (5 years or less) projects that merit priority consideration. For each Service, the total costs of these projects is from \$50 to \$60 million.

The survey data are intended to be the foundation for a budget request aimed solely at the funding of retrofit projects, in much the same way that discrete appropriations have been used to fund measures to comply with environmental standards. The creation of a phased program to accomplish the retrofits is planned for consideration in the Program Objective Memorandum FY76 (POM 76). Where possible, energy conservation measures are being incorporated into existing designs, usually at the expense of other features, such as living space, because of cost limitations.

Recommendation 6-1.3

Revise the military construction program funding to emphasize energy conservation and life-cycle costing considerations.

DOD's current Construction Criteria Manual clearly calls for life-cycle costing (Section 1-4, Design Considerations), but does not specify this estimating method with respect to energy conservation features in general. However, it does call for studies employing life-cycle cost methodology regarding the projected operation, maintenance, and repair costs of utility systems. Thus, an area of important potential savings in fuel use is covered by existing instructions.

Adherence to these instructions has been generally limited by the amount of funds available for architect and engineering (A&E) services. (Most design and costing work is performed by A&E contractors.) Life-cycle costing in the energy conservation area, including utilities, is a low-priority task in the use of A&E services. A proposed remedy is to seek increases in spending limits for A&E services, which will not occur until preparation of FY76 budget submissions. It is anticipated that once funding levels can satisfy the need for A&E support in this area, specific references to energy conservation measures in the appropriate section of the Construction Criteria Manual will be added.

Recommendation 6-1.4

Require the preparation of energy impact statements for major new construction (i. e., greater than \$1,000,000).

DASD (I&H) plans to issue guidelines for the preparation of energy impact statements for major new construction in July 1974. A decision must be made whether to issue omnibus guidelines or specific ones for existing and new construction. DASD (I&H) has noted that this decision will depend largely on the results of the energy conservation retrofit survey (see Recommendation 6-1.2).

Recommendation 6-1.5

Seek to revise current statutory limitations on dollars per square foot of personnel living space to include an appropriate amount for adding energy conservation features.

Cost data for BOQs, BEQs, and family housing are normally submitted to DASD (I&H) at the close of the fiscal year and reviewed in July to determine the components of dollar-per-square-foot costs and necessary adjustments to these figures. Thus, action to increase spending limits in light of energy conservation needs cannot be taken until preparation of the FY76 budget submission.

DASD (I&H) has noted that it is more likely that cost ceiling increases can be obtained for the per-square-foot costs of bachelor quarters than for family housing. In the case of both types of housing, any increases in the statutory limits is threatened by inflation, which impedes the attainment of existing design objectives under present funding levels.

Recommendation 6-1.6

Investigate the establishment of a revolving fund of construction capital to be used for short-term, high-return energy conservation projects.

Analysis of this recommendation reveals obstacles to successful implementation in terms of appropriation structure and accounting practices. Present facility budget review procedures that favor short-term payback essentially achieve the objective of this recommendation.

Recommendation 6-1.7

Develop and incorporate energy conservation direction in all GOCO contracts.

DOD action on this recommendation has awaited leadership from the FEO, which has been considering such action, through GSA, for all Federal contracts. DOD has focused on motivating major defense contractors rather than Government-owned, contractor operated (GOCO) facilities alone. In January 1974, ASD (I&L) transmitted advance copies of Defense Procurement Circular Number 118 to the 100 largest defense contractors. The document requests adoption of conservation measures and provides procedures for dealing with fuel shortages, and was shortly thereafter sent to all DOD processing activities and contractors.

Accordingly, the basic objective of the recommendation is considered to have been met.

6.3.2 Recommendation Addressed to the Joint Chiefs of Staff

Recommendation 6-2

The Joint Chiefs of Staff should emphasize the need for energy conservation in tactical operations and should develop a methodology to quantify the impact of fuel shortages on readiness.

Since 6 September 1973 and periodically thereafter, the CINCs were requested to review all joint training activities, including those directed or coordinated by JCS, in an effort to reduce fuel requirements without degrading operational readiness or training. Each CINC was also requested to set priorities for approval of exercises, develop lower levels of force participation, and recommend cancellation of exercises in view of then current or anticipated fuel shortages. By the end of January 1974, two JCS-directed and four coordinated exercises had been canceled. Other CINC-sponsored exercises and joint training programs were also canceled, reduced in scope and/or frequency, or had locations changed to save fuel.

Regarding a method to quantify the impact of fuel shortages on readiness, the Joint Staff has stated that such impacts would be both immediate and long-term, and the degradation would vary from one command or geographical location to another. In order to monitor readiness status, the Joint Staff employs three types of reports—the FORSTAT, daily SITREPS, and special situation reports—submitted as required. The FORSTAT was revised on 20 December 1973 to reflect degradation in unit readiness resulting from fuel shortages by the addition of new reporting codes. The CINCs are instructed to use daily SITREPS to inform the JCS of significant changes in readiness caused by the fuel situation. While indicators of readiness may be expressed in quantified terms, the Joint Staff stated that judgments of readiness are necessarily subjective, based on the personal evaluation of the commander.

The Joint Staff believes that the net effect of fuel shortages on unit readiness has been minor, with only a small percentage of thousands of reporting units now indicating degradation for this reason.

The impact of deferring joint and major exercises on overall readiness is indeterminate, and such deferrals have undoubtedly taken their toll.

6.3.3 Recommendations Addressed to the Services

The DETG report contained 12 recommendations for energy conservation actions by the Services. Service responses to the recommendations are summarized in Table 6-1. It should be recognized that these items, drawn from Service reports for the second and third quarters of FY74 to the Directorate for Energy, are only highlights and do not reflect the full range of actions taken.

Table 6-1 shows that many of the organizational and operational measures recommended have been taken, with six recommendations fully implemented according to Service reports to the Directorate for Energy. Significant problems encountered or foreseen in implementing the remaining recommendations are summarized below:

- Personnel actions. Four recommendations (6-3.7 through 10) directly concern changes in assignment, staffing levels, or grade structure of personnel assigned to utilities management and maintenance. Implementation of these measures is wholly dependent on human and financial resources currently available, both of which are under severe pressure. Actions reported thus far indicate that the necessary studies and reviews are taking place, but that full implementation may take some time. In some cases, existing resources are judged as adequate.
- Facilities. Recommendation 6-3.12 concerns the upgrading of the energy efficiency of temporary buildings or their elimination. The full implementation of this measure is closely tied to funding and therefore is still in the planning stage of review and study.

Assessment of the actual contribution to energy conservation of recommended measures is difficult. Most actions are not appropriate for direct quantitative measurement. Most Service reports of energy conservation actions do not clearly state anticipated payoffs in fuel or energy savings.

TABLE 6-1

IMPLEMENTATION STATUS OF DETG RECOMMENDATIONS TO SERVICES AND EXAMPLES OF ACTIONS TAKEN

Recommendation	Army	Navy	Air Force
<p>6.3.1 Reemphasize existing conservation programs and institute coordinated programs to include operations as well as installation support with single points of responsibility for energy use management.</p> <p>Status: Fully implemented.</p>	<ul style="list-style-type: none"> Points of contact and coordination for energy conservation matters established in major commands and installations. Army Energy Office set up. Media campaign utilized to increase awareness of energy shortages and to promote conservation. 	<ul style="list-style-type: none"> Energy Conservation Task Group established in OPNAV, composed of a Review Group and Working Group. Review Group consists of flag officers responsible for developing and approving conservation policies. NAVFAC initiated coordinated program of energy conservation surveys of facilities, with emphasis on high-payback actions. Atlantic and Pacific Fleets curtailed operations through such actions as limiting ready carrier and air wing activity to minimum essential to maintain pilot proficiency, and reducing ship operations. 	<ul style="list-style-type: none"> Headquarters Air Force assigned conservation responsibilities within functional areas. Energy Management Division under DCS (S&L), set up in November 1973, includes a Conservation Branch. Air Staff Energy Conservation Task Group also set up to coordinate conservation efforts, evaluate them, and disseminate unified policy. Energy Conservation Committees established at major command and base level. Existing programs emphasized through various communications to the field.
<p>6.3.2 Include in their schools and training programs at all levels orientation on the energy problem and the need for energy conservation.</p> <p>Status: Fully implemented.</p>	<ul style="list-style-type: none"> Five principal Army training agencies initiated two-part program that utilizes command information channels and formal training. Training in energy conservation for managers, supervisors, and professionals identified as appropriate for integration into existing "environmental protection" instruction at service schools. 	<ul style="list-style-type: none"> Chief of Naval Education and Training directed incorporation of energy conservation orientation material into training and school curricula by activities under its cognizance. Atlantic and Pacific Fleets began incorporation of conservation instruction into formal training programs. NAVFAC undertook development of energy conservation course for COs, XO's, and utility engineers and managers. Plans also to formulate training at the operator level. 	<ul style="list-style-type: none"> Major commands instituted training and information programs to promote conservation and to provide appropriate technical training in maintenance engineering areas. Civil Engineer School at Wright-Patterson AFB presently includes energy orientation in officer and officer-grade civilian continuing education programs. Civil Engineering School, Sheppard AFB, now provides training in energy conservation techniques for airmen and airman-grade civilians. AF Institute of Technology reviewing graduate course in design and construction of facilities with energy-saving features.
<p>6.3.3 Institute energy conservation seminars and follow-on field surveys to maintain field level interest as well as receive feedback on accomplishments and problem areas.</p> <p>Status: Fully implemented.</p>	<ul style="list-style-type: none"> Representatives from 12 major CONUS commands and DA staff attended energy seminar held by the Army Energy Office in January. Army Audit Agency evaluating effectiveness of energy-related activities. Audit of heating conservation efforts being completed. 	<ul style="list-style-type: none"> Chief of Naval Education and Training developed 1-week energy management course for commanders, public works officers and civilian engineers. First course scheduled for June 1974. NAVFAC initiated Shore Facilities Energy Conservation Survey Program consisting of highest priority assistance to facilities, seminars at each activity and visits by survey team. Naval Telecommunications Command scheduled quarterly field surveys on energy conservation matters. 	<ul style="list-style-type: none"> In addition to training, Headquarters has instituted such measures as the command conservation report, which indicates conservation steps taken in such functional areas as transportation and comments on adverse effects of such steps. Numerous briefings and familiarization trips used to build awareness and practical knowledge of conservation techniques. Energy briefings provided to commanders of major commands and their chiefs of maintenance, civil engineering, and supply.

TABLE 6-1

(CONTINUED)

Recommendation	Army	Navy	Air Force
6.3.4 Include specific energy conservation items for Inspector General and staff visits to all installations. Status: Fully implemented.	<ul style="list-style-type: none"> IG visits completed for several major commands and subordinate activities. DA Circular 20-36, dated 29 April 1974, directs inquiry by all Army Inspectors General to determine the adequacy and effectiveness of command implementation of the Army Energy Conservation Program. DA directed that all commands make full use of honorary and cash awards to cite significant achievements in energy conservation. 	<ul style="list-style-type: none"> CNO directed IG to include energy conservation items in its inspection program. Headquarters, USMC, took similar action. Several commands adopted energy conservation checklists for internal use. Several commands began emphasizing energy conservation in existing awards and suggestion programs. Headquarters, USMC, directed field activities to establish incentive awards programs within installations/organizations. 	<ul style="list-style-type: none"> IG energy checklist widely publicized and used during inspections. Many commands developed their own checklists. Existing conservation awards at various levels given emphasis. (Awards pertain mainly to utilities conservation.)
6.3.5 Establish an incentive awards program for utility and tactical equipment operators as well as managers. Status: Partially implemented; under study.	<ul style="list-style-type: none"> Existing conservation program has employed standards or goals for each installation, activity, and command. Results in quarters of FY74 being disseminated to major commands to stimulate interest. 	<ul style="list-style-type: none"> Pacific Fleet directed monthly ship fuel economy trials to begin during third quarter of FY74. Atlantic Fleet scheduled the start of trials by 1 April 1974. 	<ul style="list-style-type: none"> No analogous program in Air Force since flight fuel consumption mainly determined by flight profile. Studies undertaken and recommendations made regarding improved profiles that could help to reduce fuel consumption.
6.3.6 Reestablish such conservation programs as the Fuel Economy Competition for petroleum-fueled ships in the Navy. Status: Fully implemented.	<ul style="list-style-type: none"> Chief of Engineers prepared recommendations on personnel needs to maintain and operate utilities systems. This need emphasized in DA message to field commands in January. Training programs to be established, as required. 	<ul style="list-style-type: none"> NAVFAC surveys to provide guidance to commanders on optimum staffing levels for journeyman mechanics. Marine Corps noted that while it will attempt further improvement in the management of utilities and maintenance of other energy-consuming facilities, expansion of present program will require additional authorizations for personnel and funds. 	<ul style="list-style-type: none"> Improvement in utilities operation and facility maintenance within existing manpower authorizations to be carried out through training, conservation seminars, and IG visits.
6.3.7 Provide for more journeyman mechanics to improve operation of utility systems and facility maintenance. Status: Partially implemented.	<ul style="list-style-type: none"> Existing facilities engineer position performs this function, which is being stressed in correspondence and direct contact with installations. Local conservation officers interviewed during visits to evaluate effectiveness of conservation measures. 	<ul style="list-style-type: none"> The Atlantic Fleet plans to establish utility conservation engineer positions on a collateral duty basis. NAVFAC to provide commanders with technical guidance on staffing levels for utility conservation engineers to commanders. 	<ul style="list-style-type: none"> Existing ARM 91-12 calls for command utilities management and conservation officers and base conservation officers and specifies a program for improved management of utilities.
6.3.8 Establish a utility conservation engineer position at major installations to monitor the conservation program and develop conservation practices. Status: Partially implemented.	<ul style="list-style-type: none"> Staffing and grade structure in facilities engineering field will be reviewed by end of fourth quarter of FY74. 	<ul style="list-style-type: none"> Several commands initiated reviews of grade structure in this field. Headquarters, USMC, considers present grade structure to be adequate. 	<ul style="list-style-type: none"> No implementation in view of concern of Congress, OMB, and OSD regarding "grade creep" and difficulty in linking energy conservation incentives to promotions under CSC and military rules.
6.3.9 Increase grade structures in the Facilities Engineering career field to provide incentives for professional engineers at the installation level. Status: Under study; no implementation at present.			

TABLE 6-1

(CONTINUED)

Recommendation	Army	Navy	Air Force
6.3.10 Provide the services of expert utility rate engineers at the contract review level. Status: No implementation planned or under study.	<ul style="list-style-type: none"> Incumbent utility rate engineers considered technically and professionally proficient. Engineers located in Office, Chief of Engineers, DA staff, and in engineer staff elements of major commands. 	<ul style="list-style-type: none"> Several commands noted that utility rate engineers are available and utilized. NAVFAC is seeking authorization to provide additional utility rate engineering capability on regional basis. 	<ul style="list-style-type: none"> Existing commands and civil engineering functions have experience and procedures to negotiate utility service rates effectively. Authorization exists to hire consultants when personnel with appropriate expertise not available.
6.3.11 Develop contingency plans for dealing with energy shortages at individual installations. Status: Partially implemented.	<ul style="list-style-type: none"> DA has tasked installations to develop contingency plans to cope with potential problems. IG and Army Audit Agency check these plans during installation visits. 	<ul style="list-style-type: none"> Many commands initiated the development of contingency plans at individual installations. 	<ul style="list-style-type: none"> Development of detailed contingency plans by location is 75 percent complete. Plans pertain to shortages of ground fuels and utilities. Those concerning phasedowns of critical operations due to aircraft fuel shortages are function of Headquarters.
6.3.12 Institute a vigorous campaign to eliminate or improve the efficiency of temporary buildings, which are characteristically inefficient in their consumption of energy. Status: Partially implemented.	<ul style="list-style-type: none"> Over 1,000 structures were closed or winterized in response to directive to consolidate and close or winterize buildings. Report on requirements to improve heating efficiency for tempos being prepared for ASD on basis of a building-by-building survey at each installation. 	<ul style="list-style-type: none"> Chief of Naval Reserves has programmed replacement of 21 temporary buildings through FY75. 	<ul style="list-style-type: none"> Survey of all facilities in the 50 states is underway to develop work requirements and cost estimates for modifications intended to achieve a 15-percent reduction in consumption.

It is recognized that Service efforts to conserve energy have ranged beyond steps suggested in the formal DETG recommendations. Most energy savings have, in fact, been achieved in the operations sector. DOD has responded to other Presidentially directed conservation efforts implemented by other agencies, such as the FEO-GSA efforts to implement a mandatory carpooling program. Although this program caused substantial administrative problems and impacted morale, it has been modified satisfactorily. To date approximately 525,000 DOD employees are carpooling with about 20 percent of those controlled parking spaces normally allocated for employee parking being used by carpools.

6.4 CONCLUSIONS

- Reductions in DOD energy consumption in FY74 have been significant. However, the extent to which decreases in usage can be attributed to purely energy conservation measures is indeterminate.
- Many of the energy conservation measures implemented wholly or partially in response to the DETG report represent a "first cut" at the problem and were largely concentrated in operational mission areas. Longer term and more complex methods to reduce fuel use and to create institutionalized mechanisms have not been fully developed.
- Present statutory limitations and programming inhibit the implementation of recommendations that require additional manpower and financial resources to make significant energy savings in the installation sector.

6.5 RECOMMENDATIONS

Recommendation 2/6-1

The ASD (I&L) should issue revised energy policy guidelines based on a long-term need to foster a strong conservation ethic vice a short period of limited supply caused by an embargo. The following policies are recommended for continued DOD-wide application:

- a. Minimize the administrative use of vehicles, ships, aircraft, and support equipment.

- b. Strive to reduce energy consumption when operating mission equipment.
- c. Within budgetary constraints, retrofit facilities for greater energy efficiency.
- d. Maintain energy conservation task forces, committees, advisory groups, or officers at levels of command down to battalion, ship, and squadron, with direct access to the commander.
- e. Minimize flight and weapons demonstrations to those essential for training and recruiting purposes. Energy-efficient equipment should be utilized whenever possible.
- f. Buy compact/subcompact commercial sedans and station wagons.
- g. Encourage employee suggestions through incentive awards.
- h. Encourage the voluntary aspects of carpooling with the assignment of preferred parking to carpools.
- i. Conduct periodic orientation and training seminars to exchange information on lessons learned as well as successful practices.
- j. Incorporate energy conservation into troop training and information programs.
- k. Maintain a strong in-house information program fostering the conservation ethic.
- l. Keep large-scale energy-intensive exercises to the minimum level required to maintain readiness and include an energy analysis as part of the planning process.

- m. Consider energy consumption as a factor in the decision process during the design, development, and construction of new facilities and equipment. Prepare energy impact statements for projects costing more than \$1,000,000.
- n. Maintain the 50-mph speed limit for Government vehicles where safety and mission permit.
- o. Maintain heating and cooling temperatures at 65° to 68°F and 78° to 80°F, respectively.
- p. Reduce the fuel consumption of DOD- and GSA-owned administrative-type vehicles by 15 percent from FY73 levels. Mission-essential users, such as recruiting, are exempt.
- q. Exercise control over TDY travel to maximize other means of communication such as tele-telephonic communications and multipurpose staff visits.
- r. Continue to assign goals and monitor performance using the DEIS.
- s. Include energy conservation as a special topic for Inspector General and command inspection teams.
- t. Provide for consideration of energy conservation performance ratings into existing Officer and Enlisted evaluation systems in order to promote continued interest and strengthen the conservation ethic.

Recommendation 2/6-2

In concert with the ASD(C), the ASD (I&L) should give strong support to funding a 5-year facility conservation program and energy conservation features in new MILCON projects.

Recommendation 2/6-3

The Director for Energy should conduct periodic DOD energy conservation seminars to facilitate transfusion of experience among the Services.

CHAPTER 7

ENERGY RESEARCH AND DEVELOPMENT

7.1 INTRODUCTION

In its 15 November 1973 report, the Defense Energy Task Group defined the principal objectives of the DOD energy R&D program and suggested a policy framework within which priorities for selection of energy R&D programs could be established. The strategy for DOD energy R&D was further illustrated in the form of a function/time matrix. In this context, the DETG made the following recommendations:

- The Director of Defense Research and Engineering and the Services should further refine the matrix presented and use it as a basis for evaluating energy-related R&D programs
- In conjunction with the Assistant Secretary of Defense (Installations and Logistics), the Director of Defense Research and Engineering should perform a detailed review of planned and programmed energy-related R&D projects in order to restructure the overall program to be consistent with the refined matrix
- The Director of Defense Research and Engineering should assign lead responsibility for each R&D project category to one Service in order to avoid duplication and assure proper emphasis and coverage.

The sections below address the actions taken to date in response to the above recommendations and present a discussion of additional energy R&D issues that have arisen since the DETG report was published.

7.2 ACTION TAKEN TO DATE

In response to the DETC recommendations, the Director of Defense Research and Engineering (DDR&E) refined the matrix presented in the 15 November 1973 report, and assigned lead responsibility for each area. The DDR&E revised matrix, with additional refinements and Service assignments, is presented as Table 7-1. In addition, the following supplementary guidance applies to DOD energy-motivated R&D:

- DOD R&D will concentrate on DOD applications and problems (DOD missions and needs). DOD will not conduct R&D in quasimilitary or civilian technical fields where U.S. civilian agencies have the primary responsibility and greater experience and knowledge.
- Efforts will be concentrated in areas of major payoff—aircraft, ship, and vehicle operation as well as installations and buildings (R&D opportunities appropriate for DOD leadership in installations and buildings field are limited, although this is a major energy-consuming area).
- Conservation of natural hydrocarbon fuels and utilization of new synthetic fuels will have high priority.
- All DOD elements must stay current on civil agency programs and plans. Present participation in interagency working groups such as the Interagency Advanced Power Group (IAPG) and Project Independence panels should provide a mechanism to acquaint Service energy R&D coordinators with civil agency programs and to provide them with equivalent information on DOD activity.
- All DOD elements should encourage the incorporation of DOD requirements in civil agency programs where appropriate. For example, DOD needs will most effectively be met with high-energy-density liquid hydrocarbon fuels, and DOD has a strong interest in programs to produce syncrudes.

TABLE 7-1

DOD ENERGY-MOTIVATED R&D PARTICIPATION GUIDELINES

<u>Operations</u>	<u>Research</u>	<u>Exploratory Development</u>	<u>Advanced/ Engineering Development</u>
I. <u>Aircraft Operations - Air Force Lead</u>			
A. Improved Propulsion Aircraft Turbines with Reduced Specific Fuel Consumption	Lead	Lead	Lead
B. Improved Aerodynamic Drag Reduction	Lead	Lead	Lead
C. Multifuel Capability	Lead	Lead	Lead
D. Alternate Fuel for Aircraft Operations			
1. Syncrudes	Incentivize	Incentivize	Incentivize
2. Hydrogen and Methane	Monitor	Monitor	Monitor
E. Improved Aircraft Operational Procedures	Lead	Lead	Lead
II. <u>Ship Operations - Navy Lead</u>			
A. More Efficient Ship Propulsion			
1. Improved Efficiency Conventional Power Plants: Diesel and Steam	Lead	Lead	Lead
2. Advanced Gas Turbines	Lead	Lead	Lead
3. Advanced Topping Cycle Such as Supercritical Carbon Dioxide Brayton Cycle	Monitor	Monitor	Monitor
4. Turbine Driven Superconducting Generator Motor Propulsion Driven Systems	Lead	Lead	Lead
5. Nuclear Ship Propulsion (Less Reactors)	Lead	Lead	Lead
B. Multifuel Capability	Lead	Lead	Lead
C. Burn Less Critical Fuels			
1. Syncrude Fuels	Incentivize	Incentivize	Incentivize
2. Other Alternate Fuels	Monitor	Monitor	Monitor
D. Combined Chemical Dash Power and Nuclear Cruise Power Systems	Lead	Lead	Lead
E. Reduction in Non-Propulsive Energy Consumption-Improved Conversion Efficiency			
1. Total Energy/Waste Heat Recovery Systems	Participate	Participate	Monitor
2. Integrated Energy/Waste/Water Management System	Participate	Participate	Monitor
III. <u>Installations and Buildings - All Services & ARPA</u>			
A. Optimum Utilization of Technology & Equipment			
1. Conduct Analyses of DOD Buildings and Installations To Determine the Optimum Way To Invest Available DOD Energy Conservation Dollars To Maximize BTU Saved Per Dollar	Monitor	Monitor	Monitor
2. Conduct Further Performance and Economic Analyses on Primary and Supplementary Heating and Cooling; Provide Buildings for Trial Use	Monitor	Monitor	Monitor
3. Total Energy Systems That Recover and Use Waste Heat	Participate	Monitor	Monitor
4. Improve Efficiency Base and Building Energy (Heating and Cooling) Distribution Systems	Incentivize	Incentivize	Incentivize
5. Optimum Location of New Buildings and Site Placement	Incentivize	Incentivize	Incentivize
6. Energy Independence for Remote Bases	Lead	Lead	Lead

TABLE 7-1
DOD ENERGY-MOTIVATED R&D PARTICIPATION GUIDELINES
(Continued)

	<u>Operations</u>	<u>Research</u>	<u>Exploratory Development</u>	<u>Advanced/ Engineering Development</u>
III.	<u>Installations and Buildings (Continued)</u>			
	B. Advanced Technology			
	1. Advanced Power Plants of Improved Efficiency That Are Convertible to Substitute Fuels Such as Coal and Syncrude	Monitor	Monitor	Monitor
	2. Advanced Methods of Energy Storage and Distribution	Monitor	Monitor	Monitor
	3. Alternate Energy Sources and Fuels (e. g., Solar, Geothermal, Nuclear)	Monitor	Monitor	Monitor
IV.	<u>Ground Operations - Army</u>			
	A. Vehicles			
	1. Stratified Charge Gasoline Engines	Participate	Participate	Participate
	2. High-Performance High-Speed Diesel Engines with Good Efficiency over a Wide Load Range	Participate	Participate	Participate
	3. Open-Cycle Gas Turbines with Recuperators To Increase Efficiency	Participate	Participate	Participate
	4. Multi-Speed Lockup Transmissions with High Efficiency and Smooth Operation	Participate	Participate	Participate
	B. Mobile Electrical Power Systems			
	1. Stirling Engine - Generators	Lead	Lead	Participate
	2. Small Fuel Cells	Lead	Lead	Participate
	3. Efficient Turbo-Alternators	Lead	Participate	Participate
	C. Multifuel Capability	Lead	Lead	Lead
	D. Advanced Fuels and Power Systems			
	1. Refined Syncrude Fuels	Incentivize	Incentivize	Incentivize
	2. Hydrogen	Monitor	Monitor	Monitor
	3. Closed Brayton Regenerative Gas Turbines	Participate	Participate	Participate
	4. Fuel Additives (e. g., Methanol)	Participate	Participate	Participate
	5. Nuclear Energy Systems Such as Nuclear Powered Total Energy Depots and Radioisotope Power Generators	Participate	Participate	Participate

- Care should be exercised in what is included in energy R&D programs sponsored by the Services. The most important consideration is that they should also be justifiable within the DOD mission.
- All guidelines, including the participation matrix, refer only to R&D that is activated and justified primarily by energy conservation, improved efficiency, and the use of alternate fuels (energy-motivated R&D).
- Application of energy R&D guidelines further implies a clear understanding of the definition of terms used in the matrix. These definitions are:
 - Lead. DOD is the major source of R&D funding
 - Participate. DOD provides a share of the necessary funding in conjunction with other Federal Agencies and/or private industry
 - Monitor. DOD does not fund hardware development directly but observes progress closely, makes DOD's needs known, and provides resources, analyses, and indirect support (e.g., building insulation test facilities) for specific military adaptations
 - Incentivize. DOD does not fund hardware development directly but may provide appropriate incentives (e.g., guarantee a market for syncrude subject to the availability of funds), resources, and analyses for specific military adaptations.

Concurrently, energy R&D coordinators have been established in each of the Services to serve as principal points of contact on energy R&D matters. Further details on organizational aspects are presented in Chapter 8.

On 15 May 1974, the Services and the Advanced Research Projects Agency (ARPA) submitted summaries of energy-motivated R&D projects in response to the foregoing guidelines. Conformance of these summaries to the matrix and guidance is unclear. It also

appears that additional guidance is needed to cover the following considerations:

- Life-cycle cost due to energy consumption (including direct energy costs plus supporting costs associated with getting the energy to the user)
- General policy to minimize consumption of energy or use more available alternate types of energy in the national interest
- Availability of energy to meet requirements under normal and emergency conditions.

7.3 ENERGY CONSIDERATIONS IN WEAPON SYSTEM ACQUISITION

Energy factors must necessarily receive consideration along with other important characteristics in deciding which technical approaches should be followed in fulfilling future defense needs. Energy costs are high—presently accounting for about 4.5 percent of the DOD budget for FY75. Also, as was evident during the recent crisis, energy may be in short supply during a period of supply interruption. This factor should be clearly recognized in a DOD R&D policy statement of the role that energy objectives will play in acquisition decision making. Once established, that policy should guide the development of a systematic approach to appraising the energy impact of new systems throughout their development cycle. Ideally, such an approach should induce a minimum disruption in an already complex decision making process. Consideration should be given to the following techniques in developing a coherent approach for appraising the energy impact on weapons acquisition:

- Quantitative Energy Objectives. If propulsion technology is involved, the improvements in fuel consumption to be expected if the R&D is successful should be explicitly stated in project descriptions. Failure to do so virtually precludes comparative evaluation of the relative merit of projects from an energy point of view. Inclusion of quantitative energy objectives in project descriptions should be promoted vigorously.

- Energy Impact of Alternative Technical Approaches in System Development. Many factors are currently considered in the selection of the optimum technical approach in Advanced- and Engineering-Development projects. These factors are given prominent attention in such decision making mechanisms as the Defense Systems Acquisition Review Council (DSARC). Consideration should be given to adding energy impact to the list of factors considered.
- Cost-Benefit Studies. Choices among competing systems are based in part on comprehensive tradeoff studies. Energy impact should be considered in such analyses.

7.4 ARPA's ROLE IN ENERGY R&D

ARPA's energy R&D program continues to make significant contributions to the effective management and utilization of DOD energy resources. ARPA showed considerable foresight in initiating energy-related work about 2 years ago, thereby creating in selected energy areas a technology base that is currently being drawn on extensively to meet specific requirements. ARPA energy-related projects range from management tools, such as an energy information system and computer models for optimizing energy consumption, to politico-economic analyses and basic materials development as with ceramics for more efficient gas turbines. ARPA funding for energy and materials has increased from \$879,000 in FY73 to \$2,655,000 proposed by FY75. In addition, energy-related R&D is conducted in other program areas such as materials sciences. The drastically changed situation with regard to energy cost and availability requires new concepts and equipments suitable for continued investigation by ARPA.

7.5 DOD PARTICIPATION IN THE NATIONAL ENERGY R&D PROGRAM

During the DETG effort, the President announced the creation of "Project Independence" (originally envisioned as a "Manhattan Project") that would achieve total U.S. independence from foreign energy sources by 1980. Subsequently, the project's goal is being refined through the efforts involved in preparing the blueprint for Project Independence under the Federal Energy Office.

As a first step in implementing the project, the Chairman of the AEC was charged in October 1973 with preparing a 5-year, \$10-billion R&D program to achieve U.S. energy self-sufficiency. To this end, the Chairman requested inputs from all Federal Agencies and the private sector and also assignment of personnel to assist in the preparation of the desired energy R&D program. DOD submitted 122 recommended programs with a proposed funding of \$164 million in FY75. Only 14 of the programs, accounting for \$34 million in FY75, were contained in the DOD budget; the remainder would require additional funding. DOD also provided 16 professionals as panel members to assist the AEC in revising the various proposals and in preparing the report. This report has been completed and has become an important input to the Project Independence effort.

In March 1974, plans for Project Independence and the accelerated 5-year energy R&D program began to solidify around three distinct but closely related efforts. First, the FEO was assigned the lead role in Project Independence by the President, with the following specific tasks:

- Begin immediately to expedite those programs essential to achieve Project Independence
- Prepare by 1 November 1974 a comprehensive plan (blueprint) for Project Independence
- Implement the Project Independence plan.

Secondly, OMB directed that the AEC, Department of the Interior, FEO, and National Science Foundation (NSF), with assistance from other Federal Agencies as appropriate, prepare concise Governmentwide program planning documents for apportioning the FY75 energy R&D funds and developing a FY76 energy R&D budget. While DOD is listed only as an assisting agency in the area of improved efficiency (transmission and conversion of energy), OMB requested that the DOD actively assist in this effort so that its expertise and capabilities would be fully considered and included. DOD assistance was provided, with the result that several projects of interest to DOD were included in the program submitted to OMB. In addition, DOD was asked by the NSF to undertake the management of several solar projects contained in its submission to OMB. NSF's proposal was brought before the Defense Energy Policy Council (DEPC) on 24 May 1974, since the DOD role in solar R&D is to monitor the work done

by other agencies rather than to undertake major R&D projects. In considering this request, the DEPC drew a distinction between energy R&D supported and funded by DOD and that which might be undertaken by DOD as an agent for another agency. In this context, the DOD's conduct of the solar energy work was approved provided that the following conditions were met:

- Funds were transferred to DOD by NSF to cover all incremental costs associated with assigned programs
- NSF would support the DOD request to OMB for additional personnel spaces required to execute the programs
- DOD laboratories were able to conduct the assigned programs without interfering with their execution of DOD programs.

In addition, the following rationale was included in the formal response of ASD (I&L):

The Department of Defense's willingness to execute these solar programs does not change our stated position of "monitoring" solar energy R&D conducted by the civil agencies when evaluating efforts for inclusion in the DOD-funded R&D program. Rather, we envision our role in the execution of selected portions of the national solar energy R&D program as one of a contractor to NSF selected on the basis of qualifications required to conduct the assigned work. It was with this view that Defense Energy Policy Council considered the efforts proposed for execution by DOD and our acceptance under the stipulated conditions indicates our agreement that such an assignment would be in the national interest.

This policy can be applied in other cases where DOD execution of national energy R&D projects that are not justified in relation to DOD mission requirements is in the national interest.

The third effort undertaken in the Project Independence program was the establishment of the Interagency Energy R&D Committee under FEO. The Director for Energy is the DOD representative on this Committee, which has the general responsibility for coordinating

Federal energy R&D and overall planning. In this role, the Committee is actively involved in monitoring the response to the previously mentioned OMB planning efforts and the R&D portion of Project Independence. Membership on the supporting panels and committees for both Project Independence and the OMB planning effort is discussed in Chapter 8.

7.6 CONCLUSIONS

- DOD policy on participating in the solar portion of the national energy R&D program is sound and should be considered for application in other areas of the national program if so requested.
- An adequate review of DOD planned and programmed energy-motivated R&D projects to assure compliance with the refined R&D matrix and guidance has not been fully accomplished.
- There is a need to strengthen policy and procedural guidance with respect to appraising the energy impact of alternative approaches in development of defense systems.

7.7 RECOMMENDATIONS

Recommendation 2/7-1

The Director of Defense Research and Engineering should conduct a comprehensive review of DOD energy-motivated R&D projects submitted by the Services and ARPA for conformance with current guidance.

Recommendation 2/7-2

The Director of Defense Research and Engineering should introduce the concept of "energy effectiveness" as a measure of merit in parallel with "cost effectiveness" and "mission effectiveness" in DOD studies and management decisions concerning weapon system development and acquisition.

CHAPTER 8

ORGANIZATION AND MANAGEMENT

8.1 INTRODUCTION

The Defense Energy Task Group made nine recommendations on organization and management in its 15 November report. Four dealt with organization actions, four with the need for an improved energy information system, and one with energy allocation procedures. The following sections outline actions taken thus far in response to those recommendations and provide an assessment of the adequacy of the DOD energy organization and management based on experience to date.

8.2 STATUS OF DETG RECOMMENDATIONS

8.2.1 Recommendation 8-1

The Secretary of Defense should establish a Defense Energy Policy Council and an Energy Hardship Panel at the OSD level to approve major energy policies and to resolve DOD energy allocation matters.

On 17 November 1973, the Defense Energy Policy Council (DEPC) and the Energy Hardship Panel were established. As shown in Figure 8-1, the DEPC is composed of representatives of ASD (ISA), Comptroller, ASD (PA&E), ASD (PA), DSA, OJCS, and ODDR&E. It is chaired by ASD (I&L). The function of the Council is to develop broad energy policy guidelines. The Energy Hardship Panel (EHP) was intended to be a subsidiary organization of the DEPC to resolve conflicts arising out of allocation of energy resources of particular import to our impacting on the civilian sector. As originally envisioned, the EHP was to include representatives from the military services, OJCS, and DSA/DFSC, with staff support by the Director for Energy. The EHP has not been activated, however, since normal staff action under the Mandatory Petroleum Allocation Program has thus far served the purpose for which it was intended.

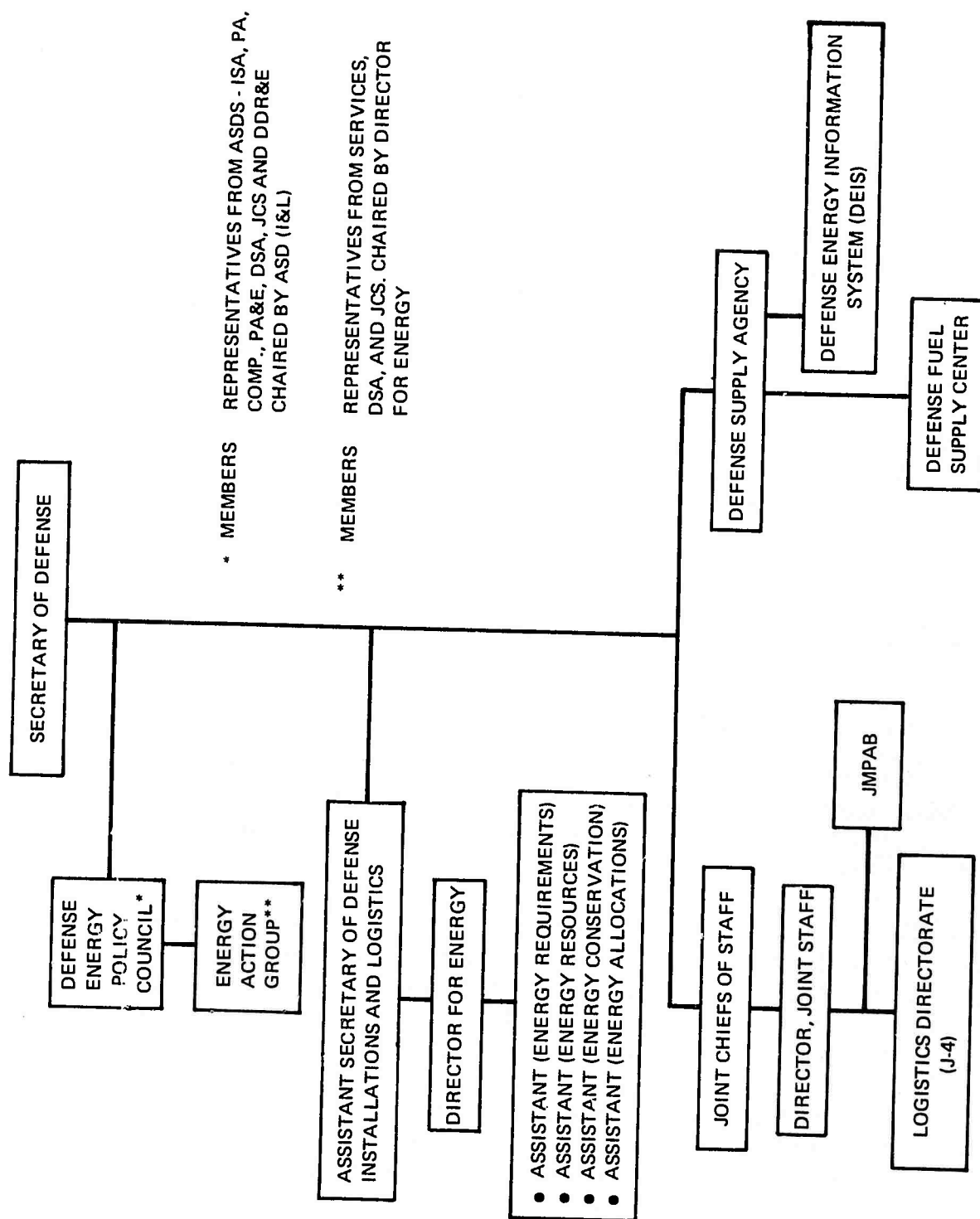


FIGURE 8-1. DEPARTMENT OF DEFENSE ORGANIZATION FOR ENERGY MANAGEMENT

To provide a framework for effectively coordinating the implementation of the Council's guidelines and a forum for information exchange, an Energy Action Group was established in November 1973. This Group is composed of representatives from the Services, DSA, and OJCS, and is chaired by the Director for Energy. The Defense Energy Data and Analysis Panel is illustrative of the evolving role of the Defense Energy Action Group. This ad hoc panel reports to the Director for Energy in his capacity as Chairman of the Energy Action Group. It is composed of representatives from OASD (I&L), OJCS, the Services, DSA, and other DOD organizations as deemed necessary. The Assistant for Resources, Directorate for Energy, serves as Chairman. The Panel has been assigned the responsibility for developing and updating the Defense Energy Information System (DEIS) Master Plan consistent with the requirements of all DOD activities and energy data requirements originating outside DOD.

8.2.2 Recommendation 8-2

The Assistant Secretary of Defense (Installations and Logistics) should establish a Directorate for Energy reporting directly to the Assistant Secretary of Defense for Installations and Logistics (ASD/I&L).

The Directorate for Energy, shown in Figure 8-1, was established on 2 January 1974 as the primary DOD focal point for energy matters. The Director for Energy reports to the Assistant Secretary of Defense (Installations and Logistics) and serves as program manager for energy. His responsibilities include:

- Developing a Petroleum Logistics Policy
- Representing and supporting the presentation of DOD positions on energy matters at Congressional hearings and interagency forums
- Assisting in the development of DOD energy budgets
- Serving as DOD principal point of contact on all energy matters and implementation of energy policy
- Managing the DOD Energy Conservation Program
- Monitoring the implementation of recommendations of the DETG report

- Monitoring and recommending priorities of DOD R&D efforts in energy and energy-related matters
- Preparing standby allocation programs for DOD
- Monitoring current energy procurement and supply problems
- Reviewing DOD requests for priority fuel supply allocations
- Serving as secretariat for the Defense Energy Policy Council and Defense Energy Action Group
- Developing the Defense Energy Information System.

In carrying out its responsibilities, the Directorate works closely with all DOD elements recognizing the energy-related responsibilities assigned to other DOD organizations. All DOD contacts on energy matters with other Federal agencies are to be coordinated with this Directorate to assure that DOD policy and positions are presented in a consistent manner.

8.2.3 Recommendation 8-3

The Services should establish a centralized organization for energy matters comparable with and responsive to the OSD organization.

8.2.3.1 Army Energy Organization

The Army organization for energy matters is shown in Figure 8-2. As indicated in the figure, the Assistant Secretary of the Army (Installations and Logistics) has established a Special Assistant for Energy, and an Army Energy Office has been established in the Directorate for Transportation and Services under the Deputy Chief of Staff for Logistics. The Army Energy Office is responsible for:

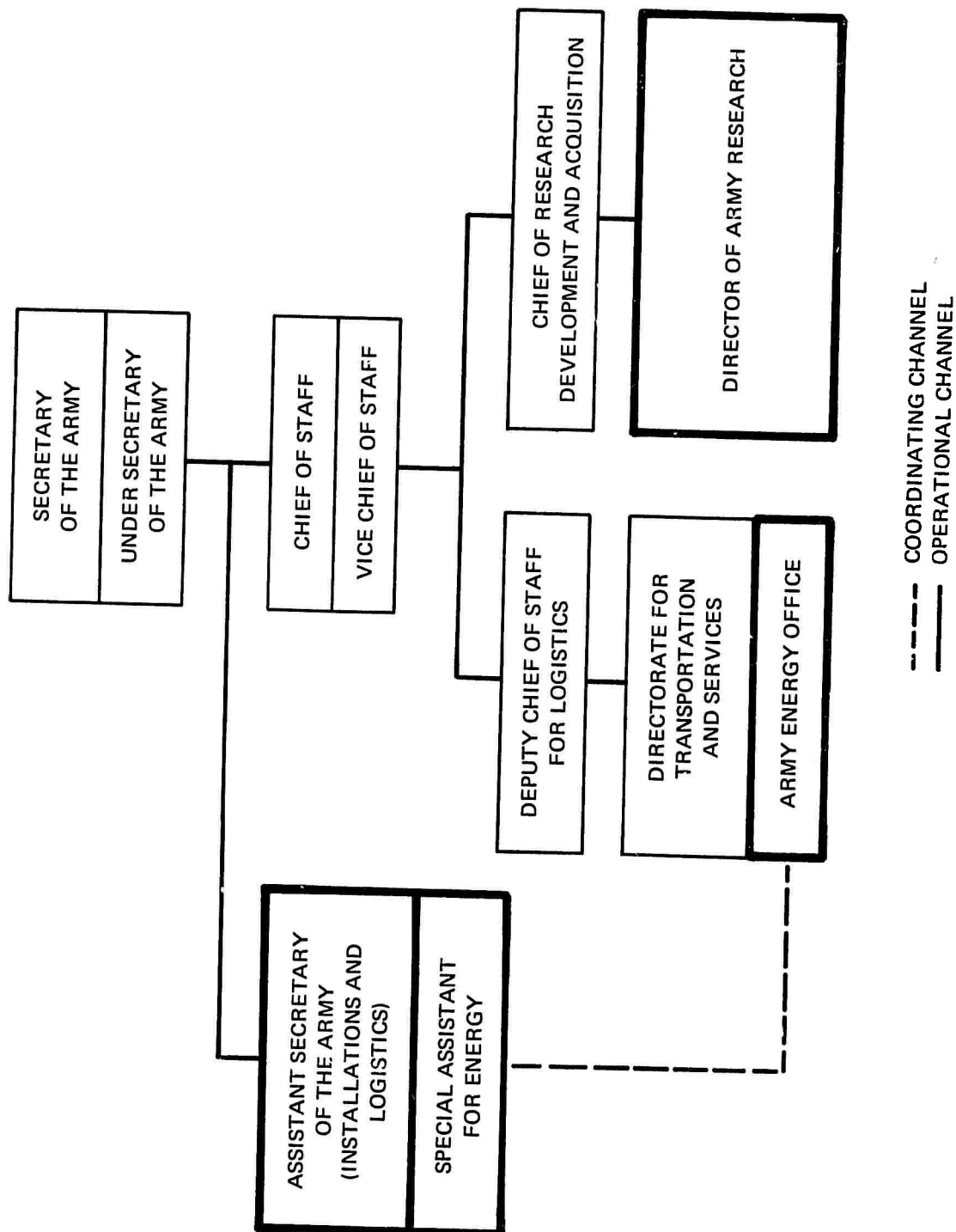


FIGURE 8-2. ARMY ORGANIZATION FOR ENERGY MANAGEMENT

- Developing, coordinating, and recommending concepts, plans, policies, and systems with respect to the allocation, supply, and use of energy resources within the Department of the Army
- Formulating and justifying Army Energy Program budgetary actions within the overall guidance and policies developed by the Director of the Army Staff and Comptroller of the Army
- Monitoring the activities of DOD and other Government agencies that provide support to the Army.

In addition, the Army has assigned responsibility for coordinating energy R&D to the Office of the Director of Army Research, under the supervision of a fulltime energy R&D coordinator. An ad hoc working group of the Army Scientific Advisory Panel has been established to determine the Army's role in energy R&D.

8.2.3.2 Navy Energy Organization

The Navy organization for energy matters is illustrated in Figure 8-3. The principal headquarters functions that have been assigned are:

- Deputy Chief of Naval Operations (Logistics) (OP-04). The DCNO (Logistics) is functionally responsible for providing policy coordination and guidance related to energy matters except those technical and management matters relating to the Naval Petroleum and Oil Shale Reserves. Systems development and implementation relating to conservation, standardization, requirements determination and analysis, facilities, and operations are coordinated by OP-04.
- Director, RDT&E (OP-098). The Director, RDT&E, is functionally responsible for coordinating energy-related research and development.
- Deputy Chief of Naval Material (Development) (MAT-03). DCNM (Development) is the focal point and coordinator for all energy-related research and development. Coordination is performed by the Navy Energy and Natural

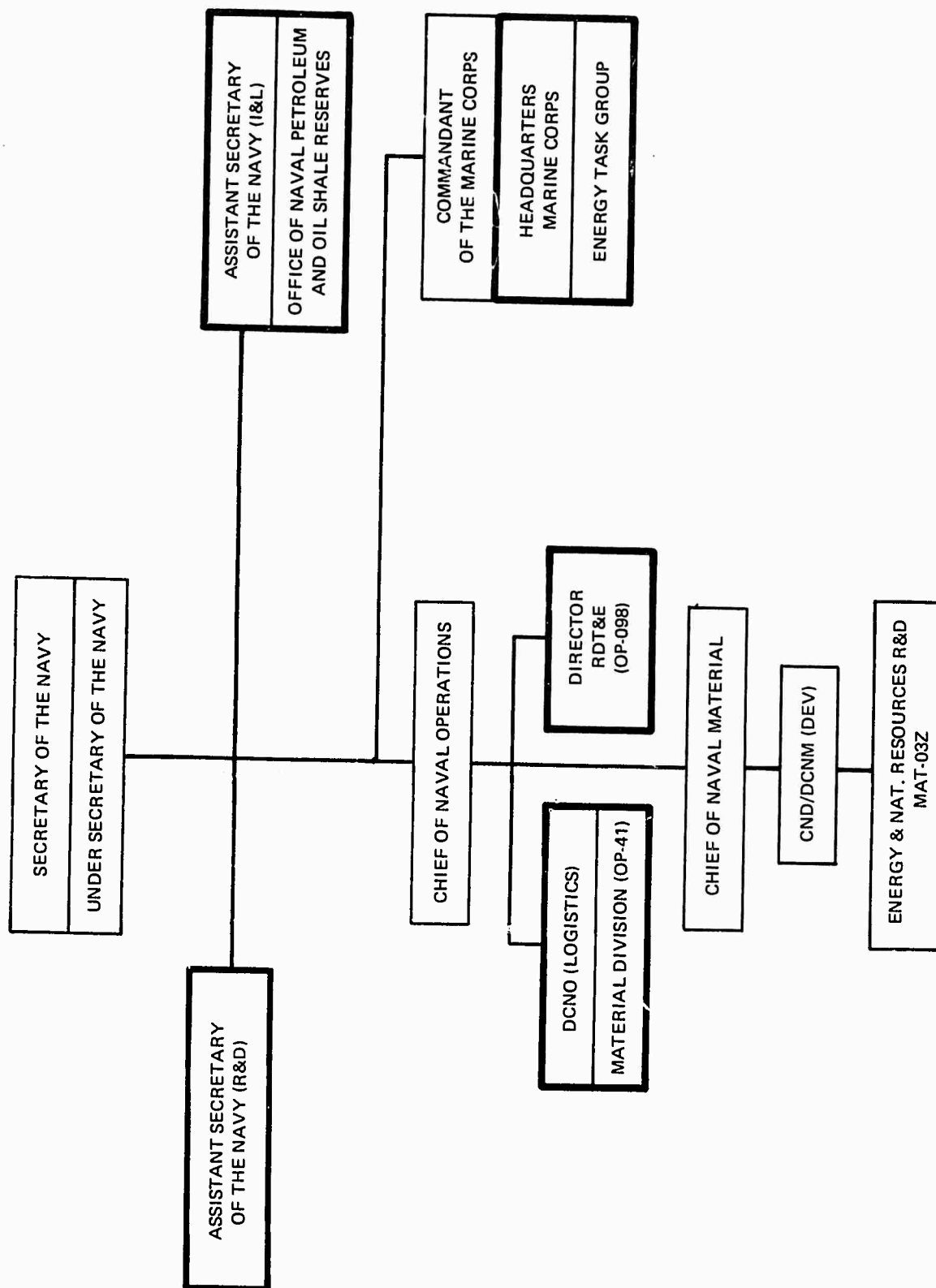


FIGURE 8-3. NAVY ORGANIZATION FOR ENERGY MANAGEMENT

Resources Research and Development Office (MAT-03Z). The mission of this Office is to supervise the planning, execution, and appraisal of Navy advanced engineering and operational systems developments and systems tests and evaluations, and is responsive to Chief of Naval Operations and Chief of Naval Material requirements for energy and natural resources programs. It manages the Energy Project of the Navy Exploratory Development Program, and coordinates Navy interests with other agencies and departments.

- Director of Naval Petroleum and Oil Shale Reserves. The Office of Naval Petroleum and Oil Shale Reserves is a separate Department of the Navy staff office established by law. Through the Assistant Secretary of the Navy (Installations and Logistics), the Director of this office is responsible to and authorized to act for the Secretary of the Navy on all matters pertaining to the Naval Petroleum and Oil Shale Reserves.
- Energy Conservation Task Group. Although this Group was originally charged with policy formulation relating to energy conservation, its scope of responsibility has been broadened to include the development and approval of basic energy policy, less R&D, within the Department of the Navy. It is chaired by the Deputy Chief of Naval Operations (Logistics) and has various working groups that develop policy recommendations and procedural guidance on energy matters.

8.2.3.3 Marine Corps Energy Organization

The responsibility for energy management in the Marine Corps is a function of the Deputy Chief of Staff for Installations and Logistics (DC/S, for I&L). The Energy Management Unit of DC/S, I&L is the focal point for energy-related matters (as depicted in Figure 8-4) and is charged with the responsibility to coordinate all actions that require a Marine Corps response and/or the development of policy.

The Marine Corps Energy Task Group serves as a forum for reviewing and analyzing those energy-related matters that impact upon the Marine Corps. Marine Corps energy-related R&D is subsumed in Navy Energy R&D programs.

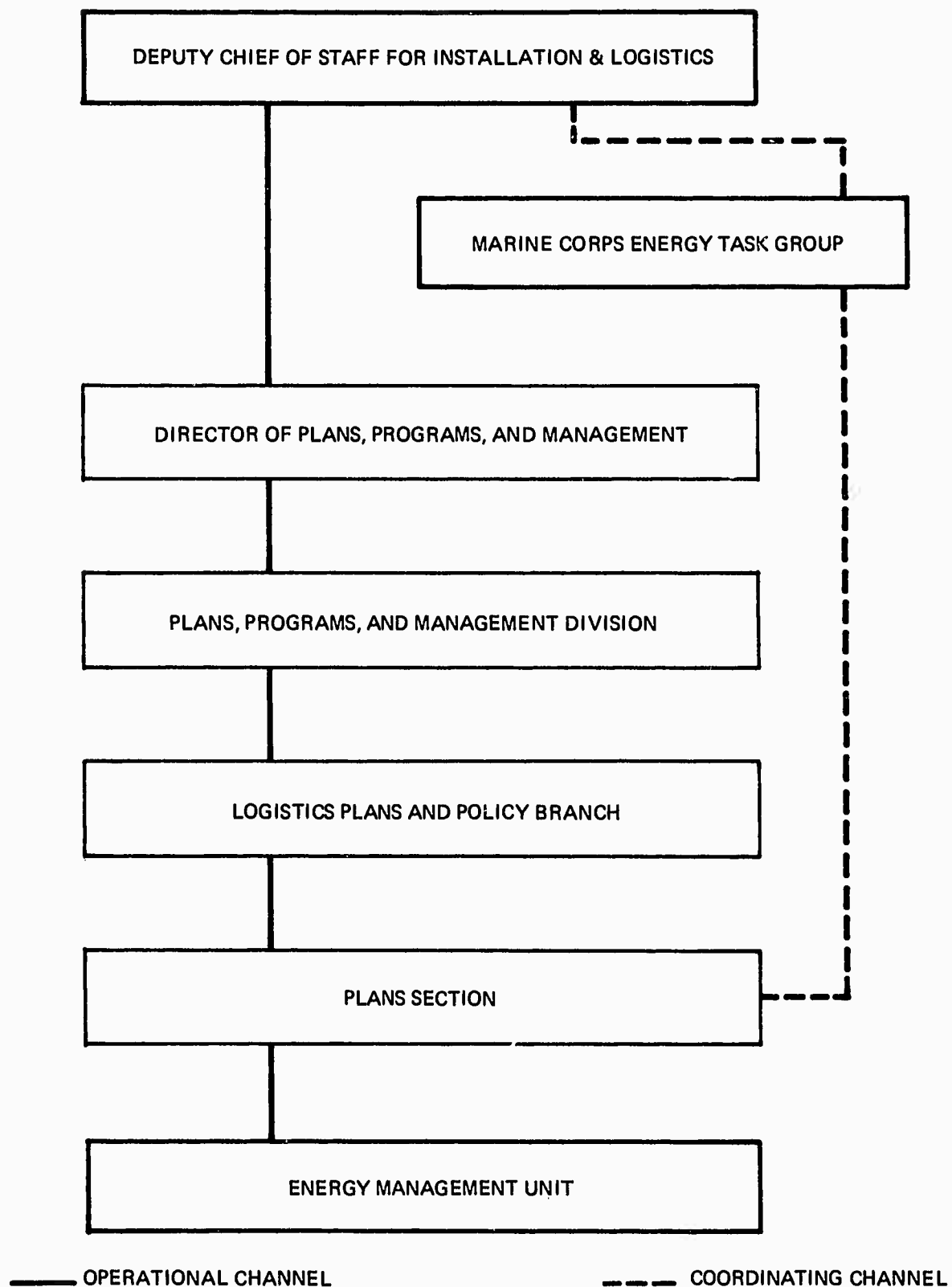


FIGURE 8-4. MARINE CORPS ORGANIZATION FOR ENERGY MANAGEMENT

8.2.3.4 Air Force Energy Organization

The Air Force organization for energy matters is shown in Figure 8-5. As indicated in the figure, an Energy Management Division has been established within the Directorate of Maintenance Engineering and Supply, which reports to the Deputy Chief of Staff, Systems and Logistics. The mission of this Division is to serve as the Office of Primary Responsibility for all policy and surveillance over distribution, storage, quality control, and conservation of petroleum-based fuels, coal, cryogenics, pressurants, and missile propellants. This responsibility includes:

- Analysis of petroleum requirements versus product availability and presentation of the data necessary for the decision process
- Review and analysis of petroleum planning factor and cognizance over energy consumption and conservation measures
- Acts as Office of Primary Responsibility (OPR) for all Air Force energy conservation policy, programs, and reports.

The focal point for Air Force energy-related research and development is in the Directorate of Development and Acquisition, reporting to the Deputy Chief of Staff, Research and Development. The Air Force Energy Steering Group, chaired by the Chief Scientist of the Air Force, is responsible for developing policy guidance on energy R&D matters. This Steering Group is composed of General Officer representatives from DCS/Plans and Operations, DCS/Programs and Resources, DCS/Systems and Logistics, and DCS/Research and Development, as well as the Air Force Systems Command and the Air Force Logistics Command. The Assistant Chief of Staff for Studies and Analysis and the Comptroller of the Air Force are also represented.

8.2.4 Other DOD Energy Organizations, Coordinators, and Focal Points

8.2.4.1 Defense Supply Agency

The Assistant Director, Plans, Programs, and Systems, for the Defense Supply Agency serves as the principal DSA focal point on

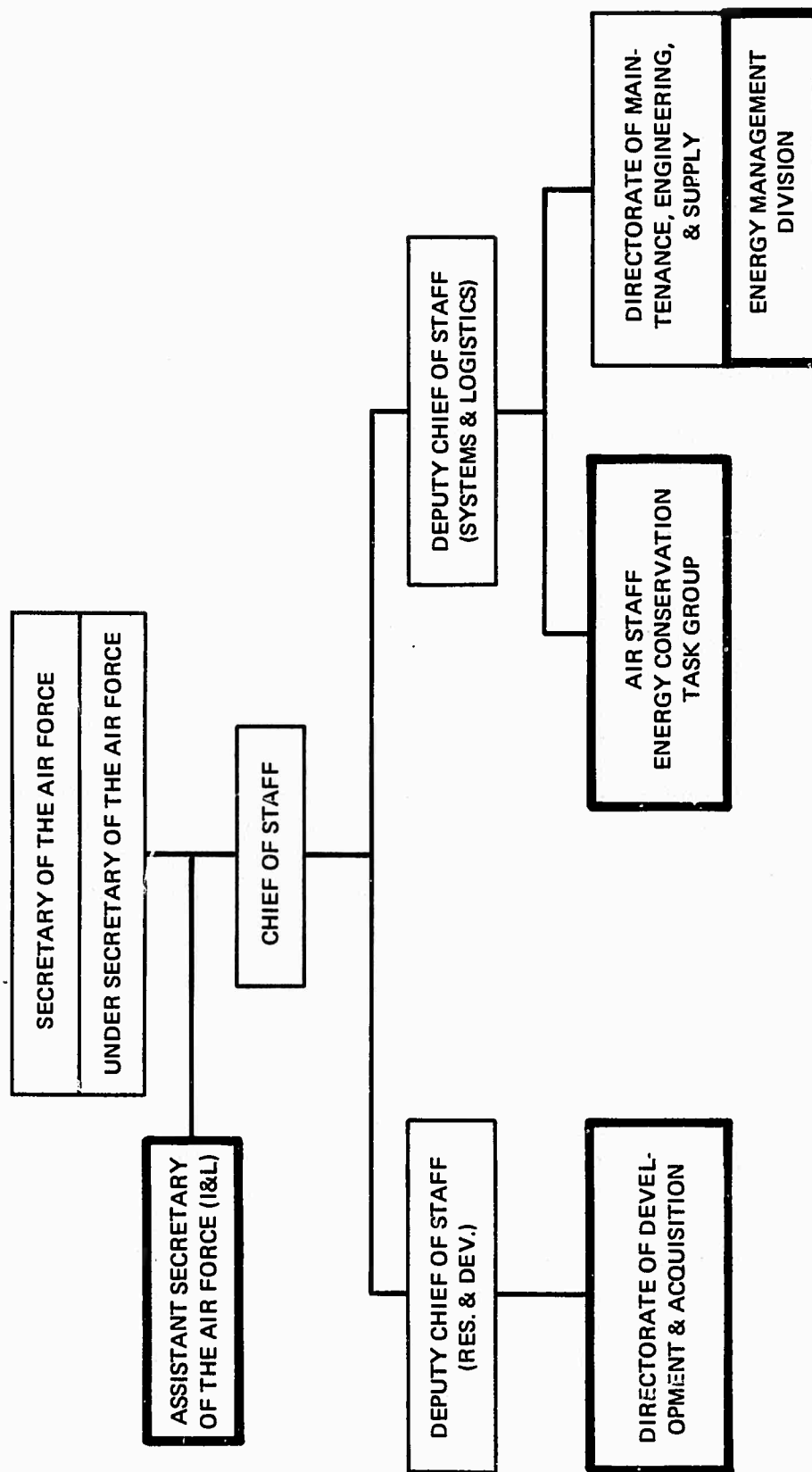


FIGURE 8-5. AIR FORCE ORGANIZATION
FOR ENERGY MANAGEMENT

energy matters, with operational and management aspects performed through normal channels by responsible staff elements. Specific staff elements have been designated to interface with the Directorate for Energy in OSD with respect to the following:

- Implementing Petroleum Logistics Policy as directed
- Representing and supporting DOD positions on energy matters at Congressional hearings and interagency forums
- Managing the DSA Energy Conservation Program
- Recommending priorities of DOD R&D efforts in energy and energy-related matters
- Developing requirements for FEO allocation programs for DOD
- Recommending solutions to current procurement and supply problems
- Responding to DOD and FEO requests for supply information.

These actions have strengthened the coordination between DSA and the Directorate for Energy, which is important in view of DSA's role in the integrated management of fuel. The Defense Fuel Supply Center (DFSC) is the principal subordinate activity of DSA for procurement and integrated management of fuel. This role is discussed further in Section 8.5.

8.2.4.2 DOD Liaison at the Federal Energy Office

The establishment of a permanent military officer billet in the Federal Energy Office as requested by the FEO in January was accomplished in order to provide liaison with the DOD in all matters concerning DOD energy requirements. The developing DOD role in energy matters, participation in numerous working groups, and effective utilization of DOD expertise and facilities in Project Independence will require continued close liaison among the OSD policy makers, participating levels in DOD, and FEO management. There is clearly a need for continued presence of a DOD liaison officer in FEO.

8.2.4.3 ODDR&E Focal Point Established

The Deputy Director (Research and Advanced Technology) has requested a fulltime energy R&D professional who would be responsible for formulating and coordinating energy R&D policy and monitoring energy R&D programs. Approval of the fulltime professional position is pending. Meanwhile, a current member of the staff is serving as the ODDR&E focal point as an additional duty.

8.2.5 Recommendation 8-4

The Organization of the Joint Chiefs of Staff should consider establishing a new organization within the OJCS, patterned after the Joint Transportation Board, should the Joint Materiel Priorities Allocation Board prove inadequate for advising the Energy Hardship Panel.

In response to the DETG recommendation, the OJCS has reviewed the desirability of establishing a new organization patterned after the Joint Transportation Board, should the JMPAB prove inadequate for advising the Energy Hardship Panel, when established. OJCS concluded that there is no evidence to indicate that JMPAB lacks the capability to establish materiel priorities, allocate resources, and provide advice as required. The ability of JMPAB to function effectively under conditions of energy shortages will, however, be kept under continuous review.

8.2.6 Recommendation 8-5

The Assistant Secretary of Defense (Installations and Logistics), the Services, and the Commanders in Chief should consider using the UMMIPS, with modifications, to indicate priorities for energy allocation.

JMPAB has approved procedures for allocation of petroleum products among Military Services that incorporated specific aspects of the Uniform Materiel Movement and Issue Priority System (UMMIPS).

8.2.7 Recommendations 8-6, 8-7, 8-8, and 8-9

The following recommendations are all related to the development and implementation of a Defense Energy Information System (DEIS):

Recommendation 8-6

The Defense Supply Agency should develop a Defense Energy Information System (DEIS) as soon as possible based on the Defense Fuel Supply Center's data bases and procedures.

Recommendation 8-7

The Assistant Secretary of Defense (Installations and Logistics) should establish a standardized reporting format for all the Services as soon as possible to provide a uniform data base on which the immediate DEIS can be built.

Recommendation 8-8

The Assistant Secretary of Defense (Comptroller) should provide resources to DSA to augment its computer system and personnel to support the DEIS development.

Recommendation 8-9

The Assistant Secretary of Defense (Installations and Logistics) should prepare a DEIS System Development Master Plan including requirements, parameters, and interfaces with other information systems to guide the evolution of the immediate DEIS into the near-term and eventual full-system capability that will include facilities data.

At the direction of ASD (I&L), the Defense Supply Agency developed a plan to provide OSD with a capability for collecting and aggregating timely information on petroleum products, and in early December 1973 its plan was approved and implemented. Program Budget Decision 292 provided \$1 million in FY75 to DSA to augment its computer system and personnel to support DEIS development.

DEIS, which was fully automated 4 weeks after its inception, is now providing worldwide consumption, receipt, and inventory data for all petroleum products on a weekly basis.

With the incorporation of the latest modifications to be effective in July, the principal features of DEIS-I are:

- Data Elements. Elements include product codes, opening inventory, consumption, receipts from commercial sources, receipts from DOD and other sources, and closing inventory.
- Reporting Format. Prepared for the current product categories, data are aggregated by major Service command as well as by FEA regions, CONUS, and unified commands. For each of these aggregations, the data summaries include wholesale and retail subtotals and summary grand totals.
- Monthly and Quarterly Summaries. In addition to the weekly DEIS-I reports, DSA will prepare monthly and quarterly summaries in the same reporting format as the weekly report. Data include opening inventory, total consumption, total receipts, ending inventory, and average daily consumption.

In addition to the data reported by retail activities and terminals, DSA will also include in the DEIS weekly report all products in transit. This report will summarize destinations by unified command and by CONUS and East and West Coast, and will identify separately that product in transit between wholesale terminals and that in transit from procurement sources.

The Defense Energy Information System was expanded in early January 1974 to cover energy usage by installations of electricity, coal, purchased steam, and hot water as well as natural gas and propane, on a worldwide basis. The first report, identified as DEIS-II, was submitted in late February 1974 with data covering January. The DEIS-II reporting cycle is monthly.

8.3 ASSESSMENT OF DOD ENERGY ORGANIZATION

8.3.1 General Assessment

In most cases, the organizations established to meet the short-term energy problems have been adequate, but structure and effectiveness have varied, and there are imbalances in the strength of management exercised over energy among the Services.

Of more concern than these imbalances are the plans for the various DOD energy management organizations in relation to future needs. Unfortunately, it is apparent that some organizations either have reduced or are planning to reduce their energy management capabilities in the belief that a reduced capability is acceptable since "the crisis is over" or because impending headquarters personnel cuts render it difficult to sustain an adequate energy management capability. The energy management organizations appear to be particularly susceptible to personnel reductions since they are relatively new and were not fully established when the reductions were proposed and subsequently levied. This general trend should be reversed and emphasis placed on the establishment of permanent energy management organizations geared to the solution of longer term problems and also capable of responding to crisis situations should they recur.* Moreover, consideration should be given to the relative complexity of each Service's energy situation in determining the scope of responsibility and manpower assigned to its energy management organization.

*In a letter of 26 June 1974 transmitting the report of the Special Subcommittee on DOD Energy Resources and Requirements to the Secretary of Defense, the Chairman of the House Armed Services Committee stated: ".... During the course of the Committee's consideration of the report, a point was made of the importance of the Subcommittee's work, particularly since the energy crisis was far from over and we could expect the problem to be with us for some period of time. I certainly subscribe to that statement, and would hope that the machinery set up in the Department to cope with the matter would not be dismantled through any false sense of complacency, but that the programs and manpower would be maintained while an unpublicized but very real energy problem remains."

8.3.2 Defense Energy Policy Council

The Defense Energy Policy Council has met regularly to consider specific aspects of the DOD energy situation. A review of the actions taken by the DEPC indicates that the council arrangement and membership are effective in resolving problems and exchanging information quickly.

Where there have been suggestions that DEPC membership be further broadened to include other OSD offices, the policy of inviting representatives from such offices only when an action item relates to their areas of responsibility appears sound, and it should continue. There does, however, appear to be a good case for including the senior military logisticians of the Army, Navy, and Air Force headquarters staffs on the DEPC. This representation would serve to strengthen the tie between policy formulation in the DEPC and its implementation in the respective Services.

8.3.3 Directorate for Energy

The Directorate for Energy (DE), OASD (I&L), headed by the Director for Energy, is organized to provide overall management in terms of both crisis-type situations and longer term energy-related problems. A review of the major characteristics of DE is useful:

- The Director for Energy has a definitive charter giving him essentially program manager responsibilities for all DOD energy matters, with proper regard to energy-related responsibilities of other organizations. This broad charter has been complemented by placing the Director for Energy directly under the ASD (I&L).
- Within their areas of responsibility, DE personnel have established both formal and informal channels for exchange of information with counterparts within the DOD and in other Government agencies. While the DE organization was conceived partially to deal with an immediate crisis situation, it also is readily adaptable to meeting longer term needs primarily through a shift in emphasis. To a large extent, the necessary adjustments have already been accomplished.

8.3.4 Organization for Energy R&D

With the exception of the establishment of the Navy Energy and Natural Resources Research and Development Office, organizational steps in the field of energy R&D have been modest in scope. Internally, ODDR&E has undertaken some efforts to improve, within manpower limitations, the management of energy-related R&D. ODDR&E has redefined the DETG matrix, established an Energy R&D Coordinating Group that meets monthly, prepared a summary of Service programs, prepared guidelines for participation in energy-motivated R&D by the Services, and responded to numerous energy-related inquiries. These initial activities have confirmed the need for a fulltime energy R&D focal point in ODDR&E to develop and pursue a vigorous program.

The Military Departments have been cautious in determining areas that should be pursued or that should receive increased emphasis in light of the current energy situation.* This caution, growing from a concern for the cost/benefit of such efforts, has been reflected principally in the Army's and Air Force's programs, although Chief Scientists of the Air Force and Army have been seeking to place additional emphasis on appropriate aspects of energy R&D. Through its establishment of an office devoted entirely to energy R&D, the Navy has been highly successful in strengthening Navy energy R&D and in assuring that energy R&D performed by others has the maximum benefit to the Navy, such as the production of liquefied coal suitable for burning in Navy ship boilers. The Air Force as yet lacks the organization by which to actively pursue investigation of how some of their needs might be met by civilian agency R&D. The Army, by assigning responsibility for coordinating energy R&D to the Office of the Director of Army Research under the supervision of a fulltime energy R&D coordinator, is actively pursuing investigations of how some of its needs might be met by civilian agency R&D. In addition, the Army's Chief of Engineers is reviewing the character and scope of near-term and long-term projected needs for energy R&D, if any, needed in support of its fixed installations. A program response to these needs is being furnished. Further, the Army Scientific Advisory Panel (ASAP) has developed the Terms of Reference (TOR) for an Ad Hoc Working Group to determine Army efforts in energy R&D. The TOR include a review of the Army's

*In addition, the Institute for Defense Analyses (IDA) has been tasked by ODDR&E to study the problem of energy-related R&D of benefit to DOD.

needs to determine what energy R&D is necessary to meet the mission requirements of the Army. The ASAP efforts are to be completed no later than 31 January 1975.

8.3.5 Energy Organization for Overall Management and Logistics

The organizational structure in the Department of the Army reflects the high priority attached to the management of energy resources by that Service by providing energy-related policy formulation at an appropriately high level. The diversity of responsibility for review, evaluation, and guidance is well delineated while allowing some degree of flexibility for integrated management for all aspects of energy-related management.

Unlike the other Services, the Navy has not established a permanent, fully staffed energy management organization, but has assigned various management roles as additional functions in the Office of the Chief of Naval Operations. One fulltime and two additional duty officers are responsible for coordination of all energy matters for the Navy. Staffing levels required for effective program management and execution in the Navy should be reexamined.

Within the Marine Corps energy management organization the Energy Management Unit (EMU) provides adequate management, coordination, and support to ongoing programs. The EMU has two billets currently authorized; however, during crisis situations staff augmentation is provided as required.

Similarly, the Department of the Air Force has established a viable and highly effective organizational structure. However, it is currently disproportionately staffed by temporary duty personnel, a situation that should be corrected by permanent manpower authorization and assignments at the earliest practicable date. The importance of an adequate and fully staffed Air Force energy management organization to the total DOD effort is especially critical in view of the fact that the Air Force consumes more than half of all DOD energy.

8.3.6 Other Elements of the DOD Energy Organization

Other elements of the DOD energy organization include DSA and OJCS. The following observations relate to those elements.

8.3.6.1 Defense Supply Agency

The DSA appears to be effectively organized to handle its role in management of energy resources. Its background in the integrated material management of fuel, more recent experience in developing DEIS, and assignment of the focal points described previously combine to yield an effective energy management structure.

8.3.6.2 Organization of the Joint Chiefs of Staff

The adequacy of JMPAB to deal effectively with peacetime energy allocation matters is a subject for continuing review. In addition, JCS has reduced its Fuels and Energy Branch staff substantially in response to the directed headquarters personnel cuts. This reduction may limit its function to that of addressing current operational requirements and constrain long-range planning.

8.4 ASSESSMENT OF DEIS

The original objectives of DEIS called for the establishment of a reliable, user-oriented, real-time system for energy data reporting. These objectives are being steadily approached. Modifications to the system have increased accuracy, incorporated more user needs, and increased emphasis on simplicity and practicality. Continued development of DEIS is needed, however, to correlate fiscal information on energy. This addition may be accomplished by direct inclusion of the data in DEIS or by establishing compatibility with other existing data bases.

Since the data generated through DEIS are of considerable importance to all levels—OSD, OJCS, military services, and unified commands—the Assistant Secretary of Defense (Comptroller) requested on 29 March 1974 that an audit be conducted by the Deputy Assistant Secretary of Defense (Audit), beginning in April, to review and evaluate the reasonableness of the reported data. An initial survey of area installations of the Services and DSA has been completed, and planning material to utilize the audit capabilities of the Services and DSA in a follow-on installation survey has been issued by ASD(C) with a view to completing it during July and August 1974.

8.5 INTEGRATED MATERIAL MANAGEMENT OF FUEL BY DSA

8.5.1 Background

Historically, inventory and financial management of bulk petroleum products have been vested in the Military Services. By definition, bulk petroleum products are liquid products normally transported by pipeline, rail tank car, road tank truck and trailer, barge, or tanker vessels, and stored in tanks or containers exceeding 55 U.S. gallons' capacity. At its inception, the Defense Supply Agency assumed responsibilities of predecessor organizations for providing centralized contracting support, included tanker scheduling, for DOD bulk petroleum requirements. DSA has assigned primary responsibility for this function to the Defense Fuel Supply Center (DFSC).

The management system for bulk petroleum within DOD has been the subject of numerous special studies in recent years, including reviews of various aspects of bulk fuel operations. These studies and investigations identified a number of deficiencies in the existing decentralized systems that indicated a need for a greater degree of integration. Careful consideration of alternative courses to achieve the desired improvements resulted in a decision to centralize and integrate the management of bulk petroleum under DSA. This decision was formally announced by the Deputy Secretary of Defense on 16 August 1971.

8.5.2 Implementation Planning

A Deputy Secretary of Defense Memorandum of 16 August 1971 directed DSA to develop a detailed implementation plan for a centralized integrated system for worldwide management of bulk petroleum. The approved concept was to be implemented in two major phases:

- Phase I provided for centralization and integrated management under DSA of assets in transit and in storage to operating base boundaries of the Military Services
- Phase II would extend DSA vertical management and funding to all base stocks funded by Service stock funds, provided such action was warranted after assessment of the requirements and progress of Phase I implementation.

A time-phased implementation plan for Phase I was developed by DSA with Service participation, and was approved by the Deputy Secretary of Defense on 19 April 1972. A target date of 1 July 1973 was approved for implementation of this phase. Phase II implementation was tentatively set for 1 July 1974. Implementation of Phase I was completed as scheduled on 1 July 1973, with transfer of Service personnel resources to DSA and capitalization under the Defense Stock Fund of assets to base boundaries. Thus was instituted a reorientation of DFSC's basic role from that of procurement activity to that of a fuels management organization.

8.5.3 Current Status

As a result of the energy crisis, the embargo, and problems that impacted on Phase I integrated management, Phase II planning was deferred by the ASD(I&L), and implementation was tentatively set for 1 July 1975. In assessing DOD experience under integrated management of bulk POL since 1 July 1973, it is clear that the primary benefits of a single integrated system over the previous multiple-Service systems are rapid, efficient response to emergencies and total visibility of supplies and demands. However, the planned reorientation of DFSC has not yet been fully achieved.

8.5.4 Planning for Phase II

DSA is now required to furnish to the ASD (I&L) by 1 January 1975 a time-phased implementation plan for extension of DSA management of POL to base level, including consideration of a single vertical POL stock fund. DSA must also furnish an evaluation of overseas operations under Phase I in accordance with the Deputy Secretary of Defense letter of April 1972 approving the Phase I plan. Consideration of future DOD plans should take into account DEIS and the visibility of assets, consumption, and receipts provided by that system, as well as the potential for greater standardization, automation, and centralization of POL management under current Phase I operations. Visibility of consumption data in full detail on a weekly basis offers a major potential for changes in the requirements determination process for system procurement and system stocks. The potential for a single, automated, current data base offered by DEIS can serve the needs of operational commanders as well as DOD managers and policy makers. Capitalizing on this data base with an on-line data system accessible to these management and command elements can contribute greatly

to streamlining the POL management system. DSA should continue its planning for Phase II or an intermediate Phase IA and should examine the potential for financial management improvements under a vertical stock fund.

The winter of 1973-1974 was relatively mild, and concurrently energy requirements were being reduced. A more severe energy crisis could conceivably occur during FY75. To enable timely DOD actions to face such a situation, it would be highly desirable for the DSA to review and advise ASD(I&L) on what interim petroleum management measures should be taken to put DOD in the most favorable posture pending implementation of Phase II.

8.6 INTERAGENCY COORDINATION

DOD involvement in interagency committees and working groups covering the entire range of energy-related R&D programs and other ongoing efforts includes the following:

- Project Independence Blueprint
- Project Independence Early Action Program
- OMB formulation of energy-related R&D programs for FY75 and FY76
- FEA interagency groups such as:
 - R&D Steering Group
 - Petroleum Situation Monitoring Group
 - Interagency Task Force on Energy Information.

In the early stages of these efforts, involvement in various task groups was initiated through personal contacts with individual participants. As a result, DOD personnel without direct knowledge of DOD policies governing participation in national energy R&D programs were assigned to the groups. Also, in at least one case, a large number of DOD representatives were working with the same group, when one or two would have represented DOD adequately. Clearly, there was a critical need for effective coordination of DOD's participation in these activities.

This responsibility is one that the Directorate for Energy is now actively discharging. Figures 8-6 through 8-9 depict the interagency participation and proposed DOD participants for Project Independence Blueprint, Project Independence Early Action Program, and the OMB-formulated energy R&D program.

8.7 CONCLUSIONS

- The Defense Energy Policy Council has proven to be an effective mechanism for coordinating policy, resolving problems, and exchanging information. Its effectiveness would be improved through Service participation.
- The Directorate for Energy constitutes a viable organization for energy management within the office of the Assistant Secretary of Defense (Installations and Logistics).
- The Defense Supply Agency management structure and procedures have been effective in carrying out its assigned responsibilities. Limited by embargo-induced stresses, DFSC is moving to a strong or management orientation.
- The Office of the Director of Army Research with the assistance of the Army Scientific Advisory Panel should provide a viable mechanism for determining Army energy R&D involvement to ensure that Army mission requirements are being met.
- The Navy Energy and Natural Resources Research and Development Office (MAT-03Z) is doing a commendable job in managing energy R&D for the Navy. Other elements of the Navy energy management organization merit reexamination for adequacy.
- The Air Force energy organization is disproportionately staffed by temporary-duty personnel.
- A critical need exists for a fulltime focal point for energy R&D in the Office of the Director of Defense Research and Engineering.

PROJECT INDEPENDENCE EARLY ACTION PROGRAM				PROJECT INDEPENDENCE BLUEPRINT																																
PROGRAM ELEMENTS PARTICIPATING AGENCIES	PROJECT EVALUATION GROUP	PROJECT PROGRESS MONITORING	DEMAND REDUCTION TASK FORCE	SUPPLY INCREASE TASK FORCE	INTERAGENCY COORDINATING GROUP	CONSERVATION				RESOURCE DEVELOPMENT								QUANTITATIVE ANALYSES				POLICY EVALUATION					R&D COORDINATING GROUP	INTERNATIONAL ASSESSMENT								
						COORDINATING GROUP	INDUSTRIAL	RESIDENTIAL	COMMERCIAL	TRANSPORTATION	DIL AND GAS	COAL	NUCLEAR	GEOTHERMAL	DIL SHALE AND SOLAR	SYNTHETIC FUELS	FACILITIES	COORDINATING GROUP	COORDINATING GROUP	SUPPLY DEMAND ANALYSIS	ECONOMIC EVALUATION	ENVIRONMENTAL EVALUATION	CAPITAL MAINT. POWER AND RESOURCES	COORDINATING GROUP	POLICY DEVELOPMENT	REGULATORY AND ADMINISTRATIVE CONSTRAINTS			ECONOMIC INCENTIVES	LEGISLATIVE AND BUDGET						
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FEDERAL ENERGY ADMINISTRATION					●	●	●	●	●	△	△	●	●	●	●	●	●	●	●	●	●	●	●	●	●	△	●	●	●	●	●	●				
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HOUSING URBAN DEVELOPMENT					●	●	●	●	●																											
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DEPARTMENT OF STATE																																		●		
HEALTH EDUCATION AND WELFARE																																				
TENNESSEE VALLEY AUTHORITY																																		●		
ATOMIC ENERGY COMMISSION						●																												●		
FEDERAL POWER COMMISSION						●	●																													
NATIONAL SCIENCE FOUNDATION						●	●	●																										●		
ENVIRONMENTAL PROTECTION AGENCY						●	●	●	●																									●		
GENERAL SERVICES ADMINISTRATION							●	●	●	●																										
OFFICE MANAGEMENT AND BUDGET						●	●	●																										●		
NATIONAL AERONAUTICS AND SPACE																																			●	
COUNCIL ON ENVIRONMENTAL QUALITY																																				
DOMESTIC COUNCIL							●																													

● DESIGNATED Δ RECOMMENDED PARTICIPATION

FIGURE 8-6. AGENCY PARTICIPATION IN PROJECT INDEPENDENCE BLUEPRINT AND PROJECT INDEPENDENCE EARLY ACTION PROGRAM

PROGRAM ELEMENTS DOO PARTICIPANTS	END USE CONSERVATION		IMPROVED EFFICIENCY TRANSMISSION CONVERSION		IMPROVED EFFICIENCY STORAGE		OIL, GAS AND SHALE		COAL EXTRACTION AND RECLAMATION		COAL UTILIZATION		NUCLEAR FISSION		NUCLEAR FUSION		SOLAR		GEOTHERMAL	
	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST
FEDERAL ENERGY ADMINISTRATION	●			●		●		●		●		●		●		●		●		●
DEPARTMENT OF DEFENSE		△		●			△				△							△		
DEPARTMENT OF INTERIOR			●				●		●		●		●					●		
DEPARTMENT OF COMMERCE		●		●							●		●		●		●			
DEPARTMENT OF TRANSPORTATION																				
DEPARTMENT OF AGRICULTURE									●											
HOUSING URBAN DEVELOPMENT	●																			
DEPARTMENT OF LABOR																				
DEPARTMENT OF JUSTICE																				
DEPARTMENT OF STATE																				
HEALTH EDUCATION AND WELFARE																				
TENNESSEE VALLEY AUTHORITY																				
ATOMIC ENERGY COMMISSION			●	●	●			●			●		●		●		●		●	
FEDERAL POWER COMMISSION																				
NATIONAL SCIENCE FOUNDATION	●		●		●		●				●				●		●			
ENVIRONMENTAL PROTECTION AGENCY							●		●		●									
GENERAL SERVICES ADMINISTRATION		●														●				
OFFICE MANAGEMENT AND BUDGET																				
NATIONAL AERONAUTICS AND SPACE		●		●													●			
COUNCIL ON ENVIRONMENTAL QUALITY																				
DOMESTIC COUNCIL																				

● DESIGNATED △ RECOMMENDED PARTICIPATION

FIGURE 8-8. AGENCY PARTICIPATION IN OMB ENERGY RESEARCH AND DEVELOPMENT PROGRAM

PROGRAM ELEMENTS DOD PARTICIPANTS	END USE CONSERVATION		IMPROVED EFFICIENCY TRANSMISSION CONVERSION		IMPROVED EFFICIENCY STORAGE		OIL, GAS AND SHAPE		COAL EXTRACTION AND RECLAMATION		COAL UTILIZATION		NUCLEAR FISSION		NUCLEAR FISSION		SOLAR		GEOTHERMAL	
	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST	LEAD	ASSIST
OFFICE OF THE SECRETARY OF DEFENSE																				
ARMY																				
NAVY																				
AIR FORCE																				

● DESIGNATED Δ RECOMMENDED PARTICIPATION
 FIGURE 8-9. DOD REPRESENTATION IN OMB ENERGY RESEARCH AND
 DEVELOPMENT PROGRAM

- Continued development of DEIS is needed to correlate logistical and financial information on energy. This addition may be accomplished by direct inclusion of the data in DEIS or by establishing compatibility with other existing data bases.
- DSA should determine what measures, if any, be taken to put DOD in a better position to cope with a renewed energy crisis in FY75 through interim improvements to the Integrated Material Management of Fuel by DSA (DFSC)
- Continued close coordination of DOD participation in inter-agency energy programs must be provided by the Directorate for Energy. To assist in this function, the military liaison billet in the FEO should be retained.

8.8 RECOMMENDATIONS

Recommendation 2/8-1

The Secretary of Defense should expand the membership of DEPC to include the Deputy Chiefs of Staff (Logistics) of the Army and the Air Force and the Deputy Chief of Naval Operations (Logistics).

Recommendation 2/8-2

The Director of Defense Research and Engineering should approve the appointment of a fulltime energy R&D coordinator on the staff of the Deputy Director (Research and Advanced Technology) at an early date.

Recommendation 2/8-3

The Directorate for Energy should continue the development of DEIS in conjunction with the Military Departments' logistical and financial information on energy.

Recommendation 2/8-4

DSA should provide an interim report by 1 September 1974, addressing what improvements should be made in the Integrated Material Management of Fuel to put DOD in a better position to cope with a possibly renewed energy crisis in FY75, and advise on progress in strengthening the management orientation of DFSC.

Recommendation 2/8-5

The Navy and the Air Force should review their headquarters energy management staffing patterns to ensure establishment of adequate levels of permanent duty personnel.